

THE BOY MECHANIC
BOOK I

PRINTED IN U. S. A.

THE BOY MECHANIC

BOOK I

700 THINGS FOR BOYS TO DO

HOW TO CONSTRUCT

MODEL AEROPLANES, BOATS, AMUSEMENT NOVELTIES,
HOMEMADE TOYS, WINTER AND SUMMER SPORT
DEVICES, CAMP EQUIPMENT, CHILDREN'S
FURNITURE, PUZZLES

AND

HUNDREDS OF OTHER THINGS WHICH DELIGHT EVERY BOY

WITH 800 ILLUSTRATIONS

Copyrighted, 1929, by
POPULAR MECHANICS CO.

POPULAR MECHANICS PRESS
CHICAGO

A SIMPLE MODEL "PUSHER" PLANE for BEGINNERS

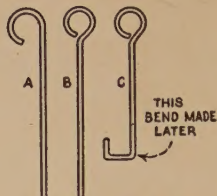
by D.A. Ross

MOTOR BODY, TAPERED FROM STRAIGHT STICK OF BALSAPINE, OR SPRUCE, 22" LONG

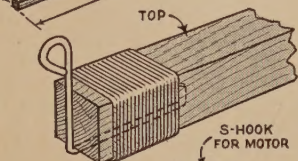
FRONT, $\frac{1}{8}$ " SQ.

22" FROM FRONT TO REAR
TAPER EVENLY

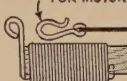
REAR, $\frac{1}{4}$ " SQ.



PROPELLER SHAFT, BENT FROM PAPER CLIP OR IRON WIRE SAME SIZE

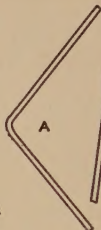
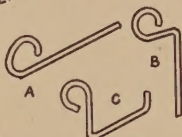


END HOOK LASHED WITH SILK THREAD AND GLUED WITH AMBROID CEMENT



RUBBER BAND MOTOR

END HOOK, MADE FROM PAPER CLIP, OR SIMILAR WIRE; BENT AS AT A, B AND FINALLY AS AT C

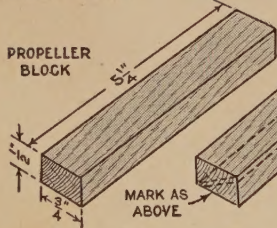


PROPELLER-SHAFT BEARING BENT LIKE COTTER PIN, A TO D, THEN AS AT E & F



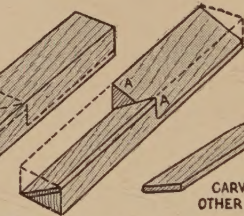
BEARING, SILK-LASHED, AND GLUED WITH AMBROID

PROPELLER BLOCK

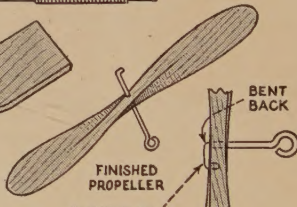


MARK AS ABOVE

- ① CARVE ONE SIDE
- ② TRIM DOWN CORNERS A

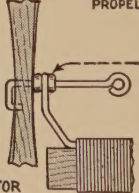


CARVE OTHER SIDE

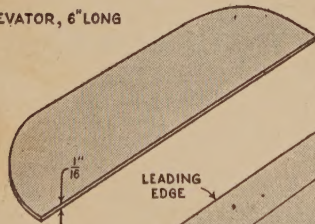


FINISHED PROPELLER
PRESSED IN
PROPELLER SHAFT FASTENING

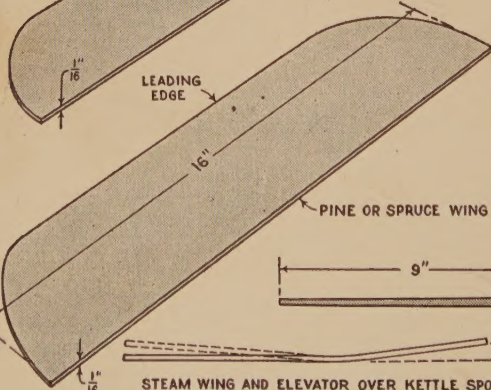
GLASS BEADS THREADED ON SHAFT AND SHAFT INSERTED IN PLACE IN BEARING BEFORE MOUNTING PROPELLER



ELEVATOR, 6" LONG

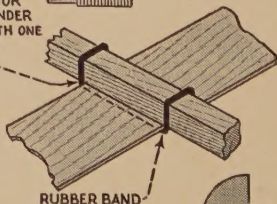


LEADING EDGE



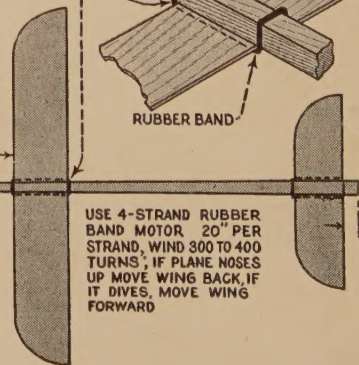
PINE OR SPRUCE WING

WING AND ELEVATOR ARE FASTENED UNDER MOTOR BODY WITH ONE OR TWO RUBBER BANDS



RUBBER BAND

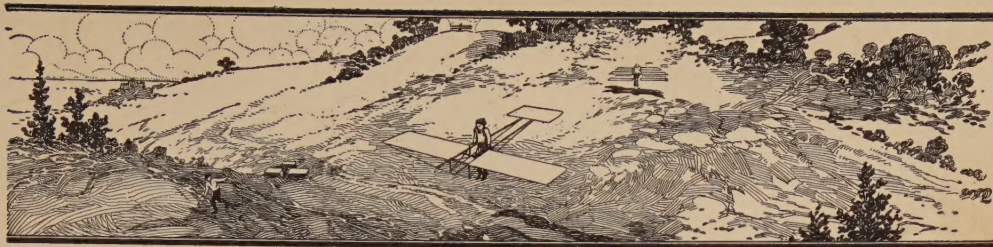
9"



STEAM WING AND ELEVATOR OVER KETTLE SPOUT AND WARP EACH END UPWARD AS ABOVE; CLAMP UNTIL DRY

USE 4-STRAND RUBBER BAND MOTOR 20" PER STRAND, WIND 300 TO 400 TURNS; IF PLANE NOSES UP MOVE WING BACK, IF IT DIVES, MOVE WING FORWARD

1 1/2"

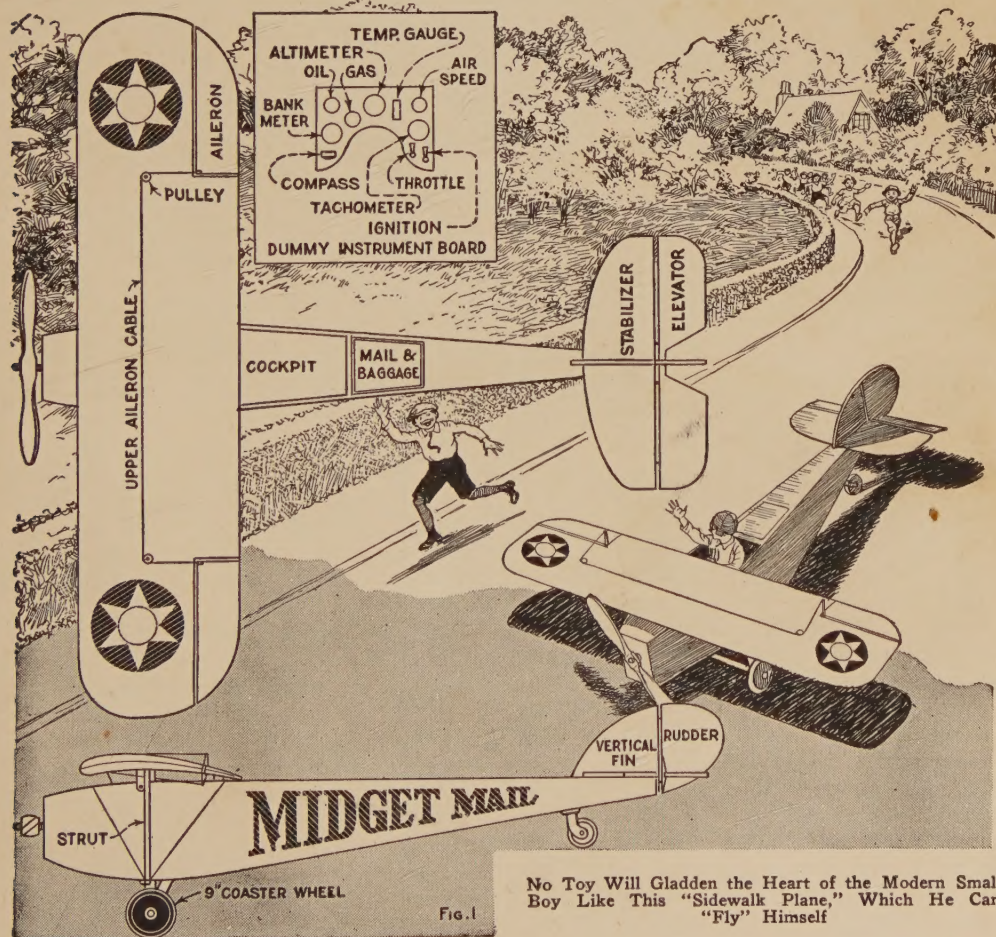


A Plane for "Lindy Junior"

By HI SIBLEY

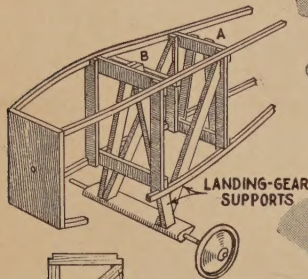
THE boys of a generation ago believed that the most glorious career lay in becoming a fireman or a circus acrobat, but now, with such an idol as Lindbergh before them, they have turned to aviation with even greater enthusiasm. Here is

something constructive that every boy should be encouraged in. Experts agree that aviation is still in its pin feathers, and that there is a promising future for all who take up flying as a career—particularly those of mechanical turn of mind.



No Toy Will Gladden the Heart of the Modern Small Boy Like This "Sidewalk Plane," Which He Can "Fly" Himself

Model planes are doing their part in a preliminary educational way, but to give the boy a more accurate concep-



ALL CROSS FRAMES LIKE THIS EXCEPT A AND B



PILOT LEGS GO THROUGH THIS FRAME

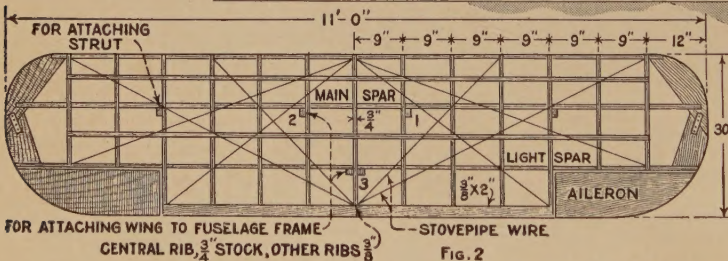
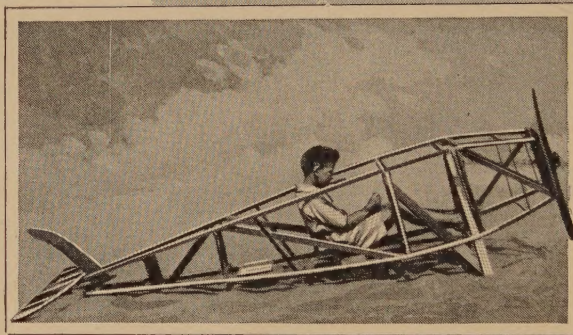
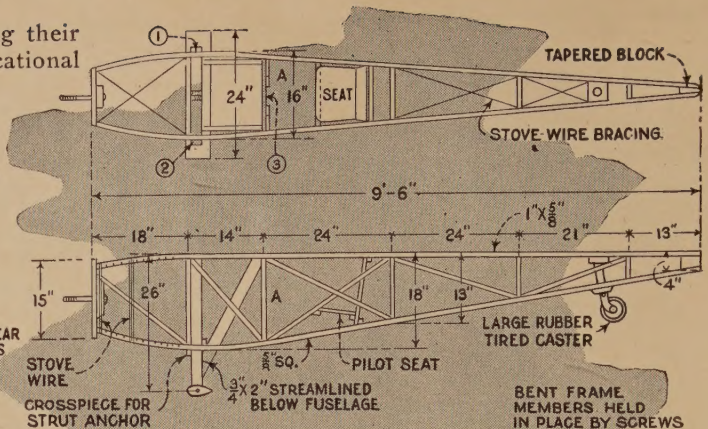
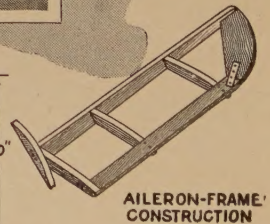
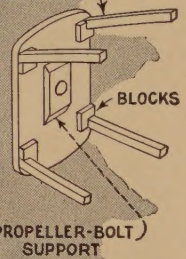


FIG. 2

tion of how a real plane is constructed and controlled, he should have a ship big enough for him actually to ride in it. The cost of the materials for the "Midget Mail" illustrated is negligible, though no little painstaking work is required. However, balanced against the educational value, the wholesome fun and the satisfaction of making it, this little ground plane is worth many times its cost in time and money. The original plane, as shown in the accompanying photos, has been the greatest success of a long series of elaborate toys at our home. In fact, it has almost become a nuisance because so many children, from toddlers up to high-school seniors, are in convention around the



BENT FRAME MEMBERS HELD IN PLACE BY SCREWS AND WIRE



house in their spare time waiting for the ship to be trundled from its hangar. There has been no abatement in weeks.

The first step is to make the transverse fuselage frames. These are all similar in design with the exception of the one (A, Fig. 2) just in front of the cockpit. This must have provision for the pilot's legs to pass through to operate the rudder bar, and also have room for the "joystick" when pushed forward in an imaginary nosedive. The corners of all frames are notched to receive the longitudinal members of the fuselage.

The latter are of $\frac{5}{8}$ -in. square section for the two bottom members and $\frac{5}{8}$ by 1-in. stuff for the top. The bottom pieces are smaller in section, because they are

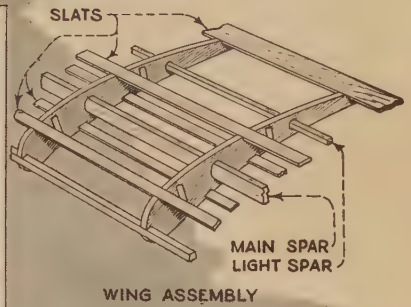
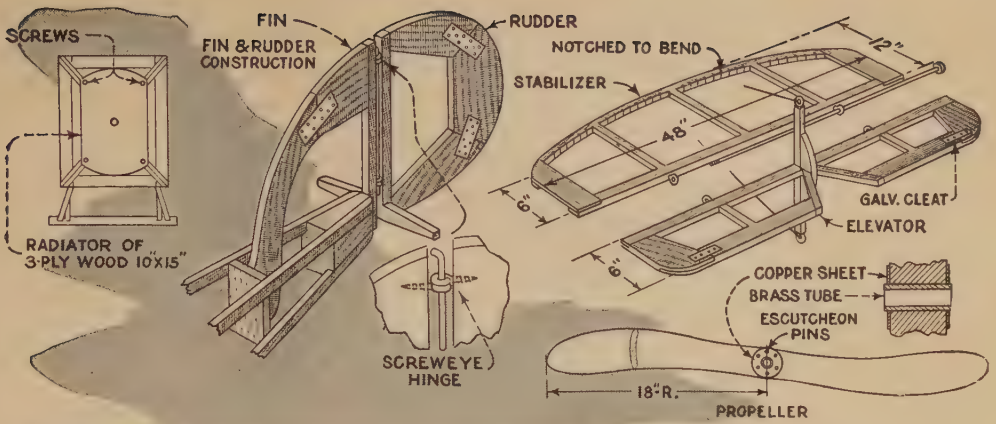


Fig. 3

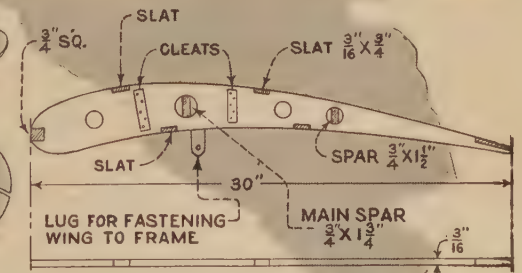
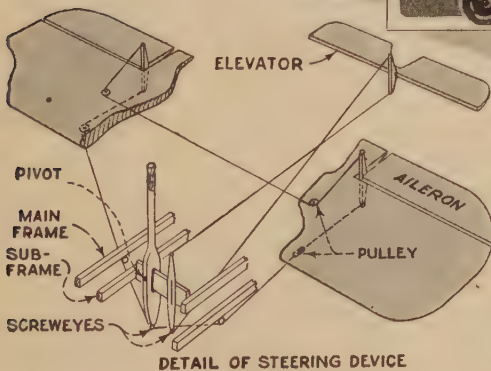
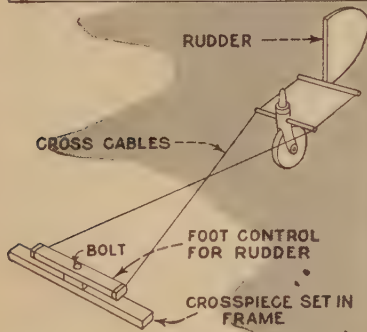


Fig. 4

DETAIL OF RIB CONSTRUCTION

required to take a greater bend. The inside corners of all four side members should be notched, about one-third through, with a saw in the front section so that they will bend in readily to meet the "radiator." They can be drawn together with stovepipe wire to meet the blocks provided for them on the inside of the radiator. Screws in the corners of the radiator board hold the latter to the frame members.

Next install the running-gear supports. These are made from 2 or $2\frac{1}{2}$ by $\frac{3}{4}$ -in. clear pieces, and streamlined where they are exposed below the fuselage. The vertical members come together at the top; the inclined ones are screwed to the side-frame members at top and bottom. A streamlined wood axle is secured to the supports with screws, and roller or ball-bearing coaster wheels are fitted to the ends with lagscrews.

For the rear wheel, which does the steering, one can use a strong coaster wheel with a steel fork, or a large, rubber-tired caster. Lacking either of these, a substantial wooden fork can be made, such as was used on the original model. This, however, is not as satisfactory as the metal fixtures. In case a metal fork is used, two arms should be attached to carry the steering cables. This is a simple matter on the wooden type.

Now brace the entire fuselage with stovepipe wire as shown, leaving the cockpit compartment unobstructed for easy operation. The stabilizer and vertical fin are easily made, the elevator and rudder respectively being hinged to them by means of a stiff wire running through screweyes. This permits easy dismantling for adjustment or packing.

The wing requires more skill than any other part of the ship, but if the diagram is followed and white pine used for the ribs, no trouble should be encountered. A main spar carries the bulk of the wing structure, supported by a light spar. Each of these pass through holes in the soft-pine shaped ribs. There are thirteen of the latter, including the heavier center rib, which is $\frac{3}{4}$ in. thick. All others are of $\frac{3}{8}$ -in. stuff. A stringer across the front edge of the wing, and a flat piece at the rear (Fig. 3) contribute their part in making the wing rigid.

Short pieces, marked 1, 2 and 3 in Fig. 2, are securely screwed to spar and center rib, as indicated, to serve as means of fastening the wing to the frame. Similar blocks are attached to hold the upper ends of the struts. The curved pieces of the wing tips are made of $\frac{3}{8}$ -in. white pine. To give the wing the correct taper toward the ends, trim down the rib widths in proportion to the distance from the end. The spars should also be tapered slightly, to permit smaller holes being bored in the outer ribs.

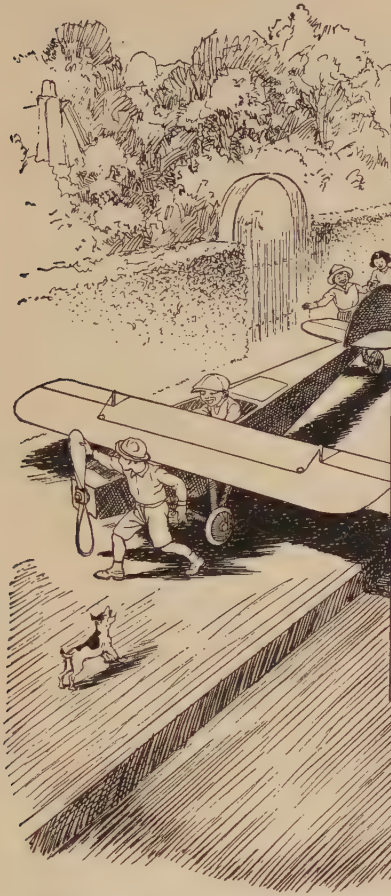
After the wing frame is completed, support it on two boxes placed near the ends, so that it will sag slightly at the center. Then brace the top side with stove wire, as shown in Fig. 2. Wherever the wire crosses a rib or slat, notch the latter not over $\frac{1}{16}$ in., so that the wire will lie below the edge of the wood. Now turn the wing over and brace it on the bottom side in a similar manner. There should be no slack in any of the bracing wires when the wing is completed.

The best propeller is made from a single piece of soft wood, but the work can be simplified somewhat by making the blades separately from flat pieces of wood and inserting them in slots in a hub block and securing them with wooden pegs. The appearance of the propeller depends entirely upon the skill of the maker, and there is no very good rule to follow in making one. It is a job for a drawshave, a small plane and a gouge. A bushing made from a short length of brass tube will permit it to turn more easily on the carriage-bolt shaft, and its appearance will be greatly improved by facing the hub with a circular piece of sheet copper and studing it with escutcheon pins.

The joystick and controls are simply made, but important, for they give the boy action while he is learning imaginary take-offs, spirals, glides, dips and nosedives. The stick control, as well as the rudder, is better illustrated than described. Wire cable is preferred to single-strand wire, picture wire being very satisfactory. The cables in the rudder and elevator control can be guided through screweyes where required, but you will find small pulleys necessary on the aileron system for the reason that there are so many corners. Apply hard grease or graphite to the

cables where they rub against screweyes. A dummy instrument board, made from

a great deal to spray it gray, orange, sky-blue, willow-green or any shade that strikes your fancy. The landing gear and radiator should then be finished with



discarded auto accessories, will add greatly to the fascination of the craft, and should include oil, gas and temperature gauges; tachometer or revolution counter; air-speed indicator; compass; banking meter, altimeter, all made of old ammeters, and throttle and ignition switch.

Tacking on the fabric, which is unbleached muslin, is very simple. Pull it as taut as possible over all surfaces, and use small copper tacks. The curved parts of the wing can be fitted by tacking, but where the corners of ailerons, rudder, vertical fin and stabilizer are rounded, a better job will be done by sewing two pieces of muslin together to fit the curves.

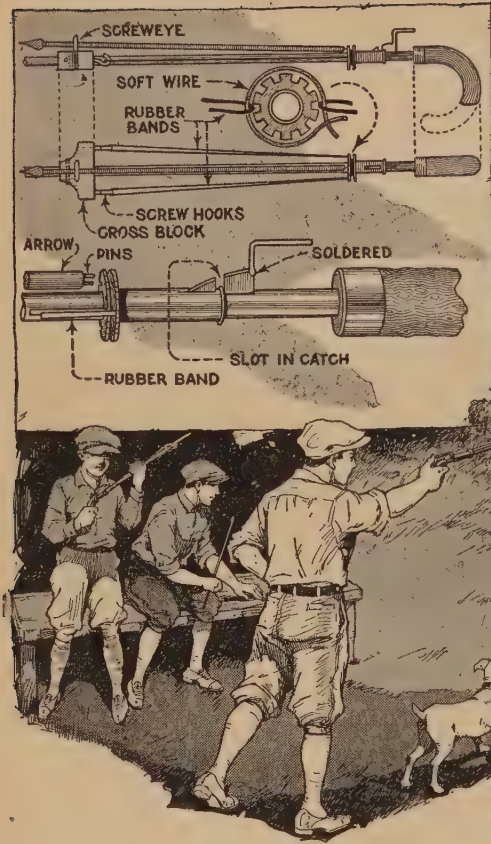
When the fabric is entirely fitted, it can be left in its original state, or your neighborhood auto painter will not charge you

aluminum paint, the instrument board in mahogany stain, and name and emblems painted on the finished work.

The young owner of this ship may be assured that he will have a line of youngsters half a block long waiting their turns to coast downhill or be pushed over level pavements. Certainly it provides a tremendous thrill, and in a stiff head wind while coasting, who knows but that it might take off? It would not take a great deal of ingenuity to equip the plane with pedal drive, taken from an old "bike," so that the pilot would be independent of a "ground crew," in the very unlikely event that volunteer "pushers" were hard to get.

❏ Don't wrap paper around a lamp to serve as a shade; if you go away and forget it, a fire might result from the heat. Use a glass or metal shade.

Old Umbrellas Can Be Used to Make Guns for Shooting Arrows; Strong Rubber Bands, Stretched as Indicated, Provide Power to Drive the Arrows Fast and Far



Spring Gun Made from Old Umbrella

An old umbrella stick, some strong rubber bands and a few little odds and ends will make a gun that is hard to beat. With it any boy can have plenty of fun and learn to be a good marksman. Strip an umbrella so that nothing is left but the steel stick, the handle and the ferrule that slides along the stick to engage with the catches. Remove the catch near the lower end and drive on a piece of hardwood, about 3 or 4 in. long and with a hole drilled through the center. This is the crosspiece and should remain near the end of the stick. Drive a large screw eye into the center of this piece and in line with the remaining catch near the handle. Solder a piece of stiff wire, which is bent in the manner indicated, to the top of the catch and file a deep notch halfway down the top edge so that the slot in the ferrule will fit over it when the catch is depressed. The ferrule flange will be

found to contain many holes where the ribs of the umbrella were previously fastened. To two opposite ones, fasten two strands of heavy rubber band, about 1 ft. long, and attach their free ends to the crosspiece, as shown. Their length must be such that they have to be stretched to their limit when the ferrule is pulled back to engage with the catch. The arrows used with this gun are made from slender lengths of tough wood properly balanced. Drive one or two pins into the butt to engage with corresponding holes in the ferrule, as shown in the lower detail. If the arrows are balanced with feathers, be sure that these will go through the screw eye without hindering the arrow's progress. To shoot the gun pull the ferrule back until it engages with the slot in the catch. Fit the arrow in the screw eye and set the pins in the ferrule holes. Aim as you would a gun, and press down on the trigger. This releases the ferrule which springs sharply forward under the tension of the bands and shoots the arrow where pointed. It will be clearly seen that the speed and range of the arrow depends on the length and tension of the rubber bands. —L. B. Robbins, Harwich, Mass.

Better Wings for Model Planes

By HI SIBLEY

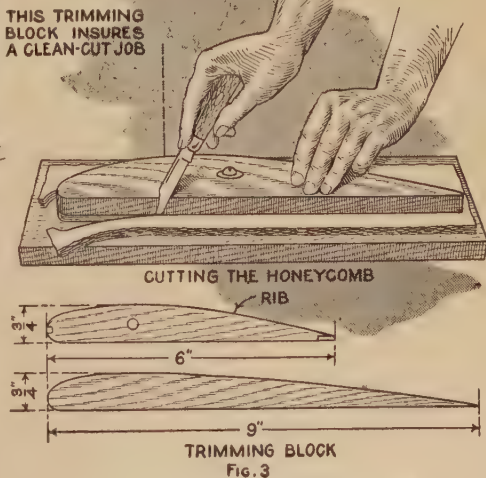
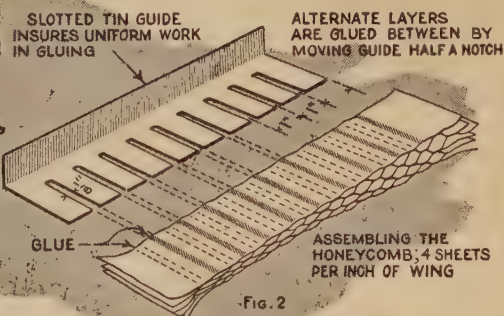
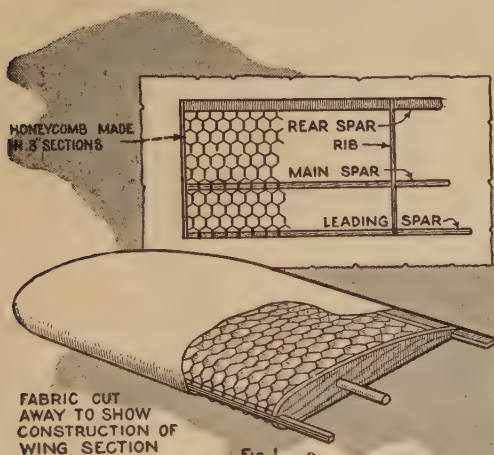
A COMMON defect in practically all model airplanes is the tendency of the wing fabric or paper to sag between the ribs. Besides being detrimental to the appearance of the wing, this loss of smooth contour lessens the lifting power.

By building in a paper honeycomb, as shown in Fig. 1, the difficulty is entirely overcome, and a smooth, tight covering is assured for the life of the plane. Fewer ribs are required—spaced about 8 in. apart—and in patching torn fabric, the honey-

comb permits pressing down on the patch. The care you use in building up the honeycomb will be reflected in the smoothness of the wing. Most any light, thin and stiff paper will do for the cellular core, architects' tracing paper being particularly suitable.

For the purposes of illustration, we will assume that we are making a wing of 6-in. chord by 16 in. long (right wing only), of rectangular design. This will require three ribs, a round-section main spar, a leading spar and a rear spar. White pine is recommended for the ribs, as well as spars, since it is stiffer than balsa wood. Plane the rib pieces down to $\frac{1}{16}$ -in. thickness, cut notches for front and rear spars and very carefully bore hole for the main spar.

Before starting the honeycomb, make a



comb permits pressing down on the patch. The cellular construction demands careful workmanship, but no more so than the multi-rib design. It is, however, best adapted to the larger models with wings of 5-in. chord by 30-in. span and up.

First of all, bear in mind that this is

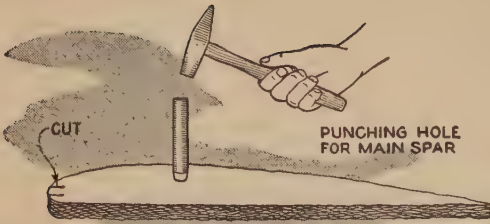


Fig. 4

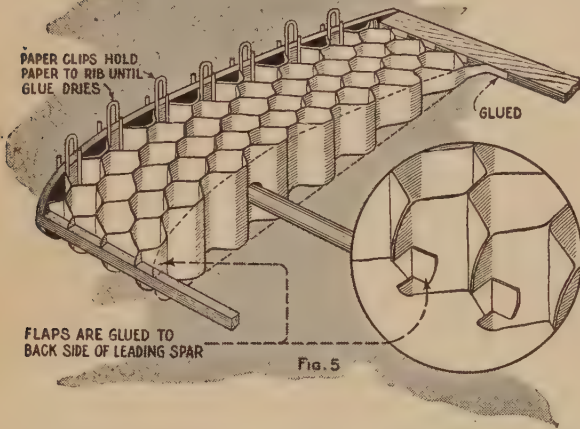


Fig. 5

gluing guide, as shown in Fig. 2, either of tin or pasteboard. This insures uniform gluing, though after some practice one can glue better and faster freehand.

Cut out 32 strips of paper, 10 in. long by $1\frac{1}{2}$ in. wide. This is just enough for one 8-in. section, there being four paper strips per inch of wing length. Cover strip No. 1 with the guide and glue through the slots. Use a small pointed brush, such as a water-color brush, and apply a thin line of glue, just enough to stick securely. Too much glue will squeeze out over a larger area and affect the symmetry of the honeycomb.

Now lay paper strip No. 2 on this, and move your guide along half a space, so that the small notch in the guide will be even with the end of the paper strip, and apply the glue. The idea is to have the glue lines on each successive strip come between those on the sheet below. Press down on the glued portions every three or four strips. When the section of 32 sheets is completed, allow the glue to dry thoroughly.

Trimming the honeycomb is next. This is most easily accomplished by making a trimming block, Fig. 3, which can be screwed down on a flat board. The trim-

ming block has the same shape as the rib, but is $1\frac{1}{2}$ times its length. For instance, the trimming block for the 6-in. rib should be 9 in. long, but the same depth, and the holes in both should be one-third the distance from the front. Sharpen your knife well.

Make a punch, the size of your main spar, by filing the end of a piece of tubing to a cutting edge. Punch holes in the honeycomb by laying the strips on a heavy block and driving the punch through with a hammer. See Fig. 4.

Having trimmed the honeycomb pad to the elongated rib shape, stretch it out gradually, a little at a time, until it will stay approximately in its final shape. Assemble the spars to the end rib, securing them with glue and pins, cut to about half their length, using the headless ends. Slip the honeycomb over the main

spar and glue one end to the rib, holding it with paper clips, Fig. 5, until dry.

Next fasten another rib, 8 in. from the end. Glue the other end of the honeycomb to this. The front ends of the honeycomb are fitted over the leading spar and the flaps glued to the back of the spar. The rear tapering ends are folded at right angles and glued to the front edge of the rear spar. We repeat, patience will be required to do this well, but the results are worth all the pains you take. The same process is followed with the remaining sections.

With the honeycomb in position, firmly glued and dry, you can put on the fabric. Japanese rice paper is good material and easy to handle, and thin silk even better, if you know how to stretch it tightly. Glue your paper first to the front edge of the leading spar, pull firmly over the top surface and glue on underside of rear spar, as well as to the edges of the ribs, drawing it tight on all sides. Glue the bottom surface to the bottom side of the rear spar. When completed, you will be pleasantly surprised at the smoothness and graceful contour of the wing.

The same construction can be applied to tapering wings, that is, those which

have a narrower chord at the wing tip than at the body, by contorting the honeycomb. This article, however, is not intended to illustrate the best proportions of the wing; that depends entirely on the type of plane you are building. Here we are concerned only with the cellular construction.

Method of Building Up Broken Parts in Welding

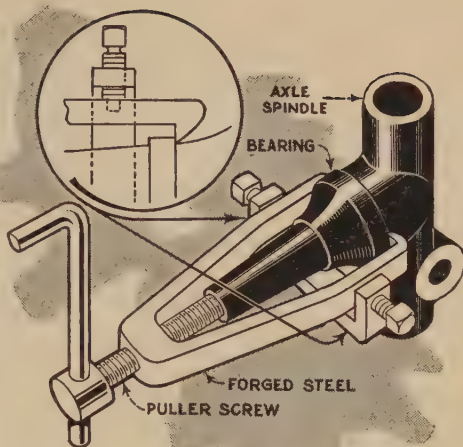
When it is necessary to repair a broken part by oxyacetylene welding at a point where there is a hole or opening in it, as for instance a crank, and some metal around the hole has been lost, it is an easy matter to build it up in the following way: Get a piece of carbon rod that is a little larger than the hole in the broken part and grind it down to fit the hole snugly. Then begin to weld to the broken edges and work toward the center until all the parts meet and are as heavy as the surrounding metal. The welding will not adhere to the carbon and the carbon will not melt. When complete, pull out the carbon, and the repaired part will be found as good and strong as it was before it was broken.—W. C. Loy, Rochester, Ind.

Substitute for Small Nut

It is often rather difficult to replace a small nut of odd size and thread, but a good substitute can be made from the end of an old film spool (which is easily procured). The end having the hole, not the key slot, is used for this purpose. Cut the spool close to the ferrule and bend the metal flange up, to form a thumbnut as shown. It is an easy matter to turn this nut substitute on the



threads of the screw or bolt. The wood catches the thread and it is held from spreading by the crimp of the ferrule. You will find this entirely satisfactory.—F. W. Bentley, Jr., Missouri Valley, Iowa.



Tool for Pulling Force-Fitted Bearings from Auto-Axle Spindles

Tool for Removing Bearings from Axle Spindles

Force-fitted bearings on the front-wheel spindles of autos are difficult to remove, and the usual gear pullers are not serviceable for this work, as the bearing rests close to the shoulder of the spindle and only the edge can be gripped by the puller. Where much of this work is done, it will be found worth while to make a special puller like that shown in the illustration. The body is a steel forging having hook jaws to engage the edges of the bearing. A clamp is provided to straddle the jaws of the tool to prevent them from spreading. Setscrews are used to hold the clamp to the jaws, small depressions being drilled in the latter to receive the ends of the setscrews. The body of the tool is drilled and tapped for a puller screw to which a small crank is attached. Turning the crank causes the tool to pull the bearing off with very little effort and without distorting the ball races.—G. A. Luers, Washington, D. C.

Filtering can be speeded up considerably if a piece of wire screen is cut and formed into a cone that will fit into the funnel. Put the screen cone into the funnel and then place the filter paper on the inner surface of the screen. This will allow the liquid to flow from the entire surface of the paper.

A Backyard

by

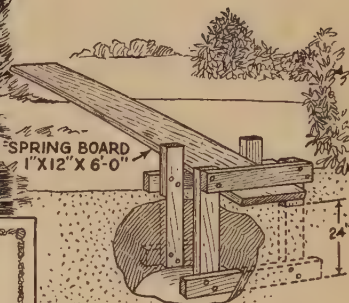
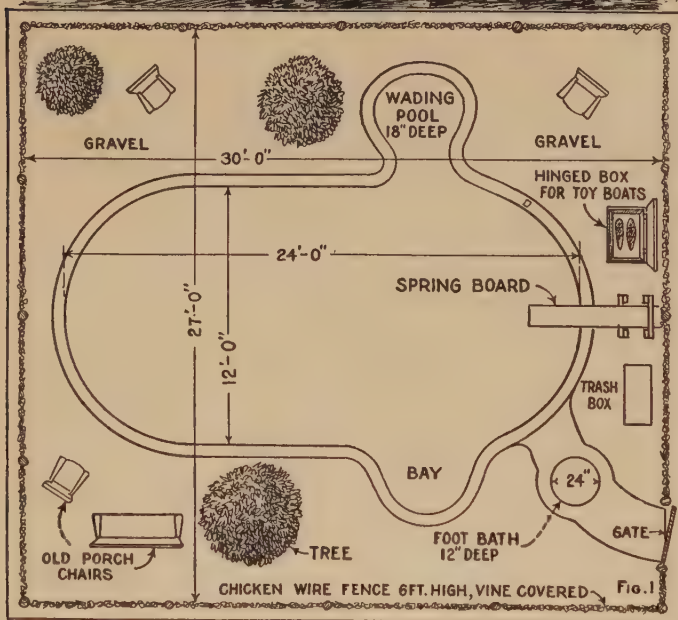


Fig. 2



necessary, since so many capable boys in the neighborhood clamored to have a hand in it. They proved good workers.

Incidentally, the pool has made a very attractive corner out of what seemed destined to become a rubbish heap.

Any location, within reach of a water supply, is satisfactory, though if you have any choice, always select the highest ground. This facilitates draining. Our

SWIMMING pools are generally assumed to be luxuries reserved for those of ample means. Here is one the rest of us can afford. The materials for the original illustrated cost only \$17.20, which covered eight bags of cement and four yards of sand and gravel. The price of cement at 65 cents per bag and sand and gravel at \$3 per yard was secured through a friendly contractor building a house next door, but even purchased direct, they cannot be much higher elsewhere in the country.

No outside labor was hired. It wasn't

pool has no drain at the bottom, and the water is dipped out by means of a well-sweep, a process which may seem slow at first glance, but which proved by far the best method. Besides, it eliminates the costly complication of a sewer connection. Located high enough, the water can be siphoned out, but if on low ground, it cannot be distributed to garden and lawn. The efficiency and convenience of the well-sweep will be explained later.

Having selected the location, mark out your desired outlines. The irregular shape of the writer's pool—the neighborhood

Swimming Pool

Hi Sibley

pool, that is, for they all use it—was designed thus to get around trees on the plot. (See Fig. 1.) Any shape may be chosen, though irregular lines are more pleasing than the conventional rectangle.

In case the soil is dry and hard, scoop out enough to hold a puddle of water. Let this soak in two or three days, and then dig, distributing the dirt removed around the edges of the hole. Thus you will be obliged to dig only 3 or 4 ft. for a 5-ft. depth. Grade off this loose soil around the edges so that it slopes away from the pool. This will carry the water off to the vines which are to be planted around the borders of the plot. A 45° slope is not too steep for a child to climb out, and will hold the fresh concrete nicely. However, you can work at even a 60° angle. At the deep end, make a slight depression so that, in cleaning, sediment can be washed into this pocket and bailed out easily.

When excavating is completed, sprinkle the sides with a fine spray but take care not to wash it down. See that the edges are also packed down well by tramping on them. Otherwise your parapet will crack when the soil beneath begins to settle from the moisture splashed out of the pool.

Before beginning the concrete work,

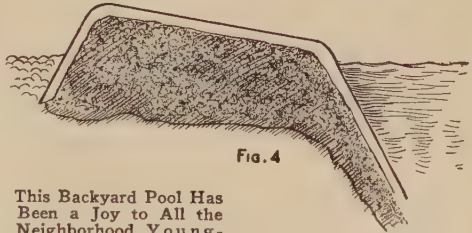


Fig. 4

This Backyard Pool Has Been a Joy to All the Neighborhood Youngsters; the Gang Shown in the Head Have All Learned to Swim in It

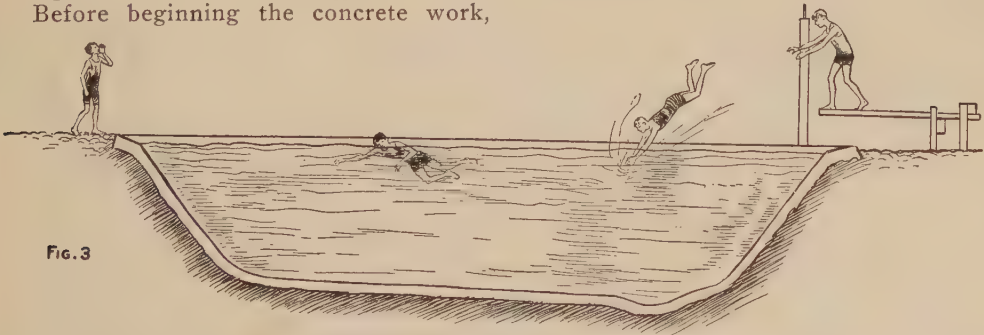


Fig. 3

make a small mixing boat as shown in Fig. 6. You will find it handy for many other jobs thereafter. One with a galvanized

sheet-iron bottom is preferable to wood.

It may interest and encourage the beginner to know that the writer never



mixed a trowelful of concrete before beginning on this job. The result, however, has proved satisfactory after a summer of daily use. In fact, the legion of young water dogs that have sprung up in this vicinity indulged in a daily plunge all through last October.

Mix Portland cement in the proportion of one shovelful to seven of coarse sand and gravel, with enough water to make it of a mushy consistency. Lay it about 2 in. thick, as indicated in the sections, Figs. 3 and

4. Experienced concrete workers predicted this would not be thick enough, but in practice it has withstood a long, hard season, and there are no signs of cracking. On this job, we began at the top and worked toward the bottom; you may find it more convenient the other way around. The parapet should be 5 or 6 in. thick. A mason's straightedge with level is the proper instrument for getting the parapet level, but not having this equipment, we constructed a makeshift device, as shown in the sketch, Fig. 8. By means of this we were able to stake out strings, criss-cross and along the parapet, which were fairly level.

The first rough course was allowed to set for two days, being frequently sprinkled on the second day. On the third day, work commenced with the second course, consisting of one part cement to five of fine sand, and water. This was laid about $\frac{1}{2}$ in. thick, allowed to set two days and kept moist in the meantime. While this is green, make it as smooth as possible with the trowel, as ridges and humps are uncomfortable to the feet. For the final coat, mix waterproof cement and water to a soupy consistency, and paint the entire surface, using a long-handled calcimine brush. This, too, should be sprinkled on the second or third day, or as soon as it will take water without running.

Spread loose gravel around the pool to a depth of 2 or 3 in. This is to prevent dirt being tracked into the pool. Don't

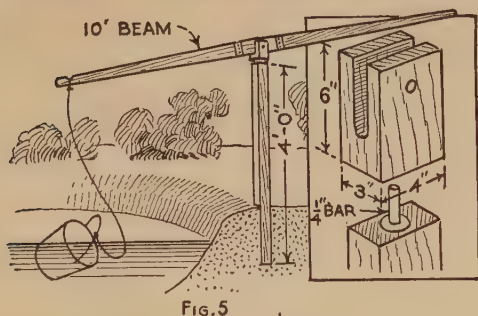


FIG. 5

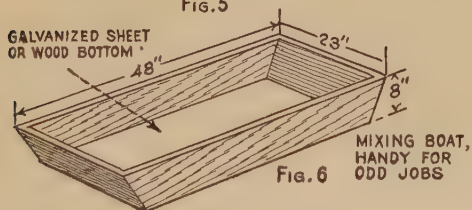


FIG. 6

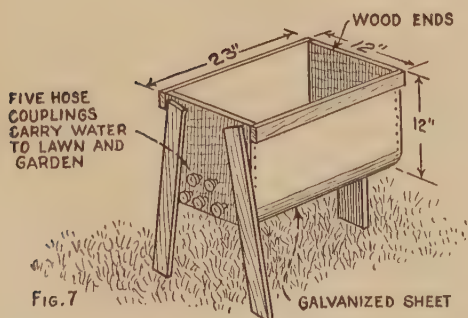
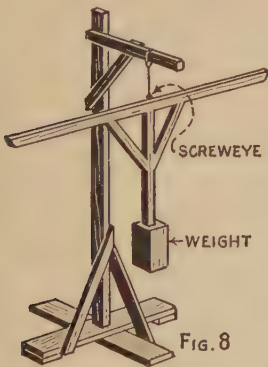


FIG. 7

The Wellsweep and Distributing Tank Shown in the Photo Serve the Double Purpose of Bailing Out the Pool and Watering the Lawn and Garden

make the mistake the writer did at first, of putting sod around the parapet. It looked well, but soon after bathers began running around and splashed water over it, it became a morass. All of it had to be taken up and replaced with gravel. The latter allows the water to drain off to the edges without any mud.

The foot bath, a small pool built 3 or 4 in. lower than the parapet, is a great help in keeping the water clean. It is located between the entrance and pool, so that all bathers must step in it first. Around the plot a 6-ft. chicken-wire fence was erected, and fast-growing vines, such as morning glory and Japanese hop, were planted. The fence is almost a necessity, as the pool is such an attraction that uninvited guests will make use of it at all times if it is accessible. Water splashed from the pool assures a most luxuriant growth of vines.



bound to accumulate. These, as well as the fence, were painted moss-green. Discarded wicker porch chairs provide comfort for spectators and bathers.

A short springboard (Fig. 2) at the deeper end will help the beginner in diving. This can be firmly anchored by pieces of two-by-fours, arranged as in the diagram and buried about 2 ft. deep. If you have plenty of material left over from the pool, set the two-by-fours in concrete and they are there to stay. A piece of al-



Bird's-Eye View of the Completed Pool, Which Is Never Without Its Quota of Enthusiastic "Water Babies"

most any available lumber, 1 by 12 in. by about 6 ft. long, makes a good springboard. Don't locate this too high above the surface of the pool, unless all your swimmers are practiced shallow divers.

Under normal conditions the water in the pool will keep fairly clear for about two weeks. Copper-sulphate crystals in a cloth bag should be swished through the water every morning—just enough to give a faint blue tint. This is done to prevent the growth of algæ, the greenish plant present in all stagnant water.

About 24 hours were required for siphoning with a 1-in. hose. This, of course,



Close-Up of the Distributing Tank, with One Hose in Place; the Sweep Is Removed from Post in This View

involved no labor, but all the water was lost because the only place low enough was some distance from the pool. In order to apply this useful water to our own plants, a well-sweep and distributing tank, Figs. 5 and 7, were made.

This might seem a laborious process, but it is not. We have unlimited man power. By working the sweep, the boys earn their right to use the pool, and take turns at beam or bucket. We always have more help than can be used on the bi-monthly bailing.

When making the pool, set a post, about 3 by 4 in., in the concrete parapet at the deep end, so that about 4 ft. is above the surface. Bore a hole in the top to receive a piece of $\frac{5}{8}$ -in. bar iron. A bolt, with head cut off, or section of cold-rolled steel, will do. The swivel or beam fork is sawed out from a wood block, as shown.

The distributing tank consists of two wooden ends, 12 by 12 in. by about 1 in. thick, to which is nailed a single sheet of galvanized iron, forming sides and bottom. The lower corners of the ends are rounded in order to fit the sheet iron snugly at these points. Only three legs are used so that the tank will stand level wherever placed. In one end, install five hose couplings, which number will drain the water as fast as the tank can be filled with well-sweep and bucket. Hot tar is poured into corners where galvanized iron joins the wood ends, and a piece of wire screen is tacked in the draining end. Do not place the screen flat against openings, as it will soon clog with leaves and debris. Bend the screen out so that it bulges 2 or 3 in.

The object of the raised distributing tank is to give gravity to carry water through the five lengths of hose to various parts of lawn and garden. Three days before

draining, discontinue the copper-sulphate treatment, as it is well not to run off too strong a solution on delicate plants. However, although we have been careless on this point, we have not yet detected the slightest damage to any of our plants or grass.

Maintenance, as well as construction, has been very inexpensive. With two fillings per month, our water bill has averaged only \$5.50, which included a liberal use in the house and on the front lawn, during our five months of dry weather.

In many ways this pool has been a great success. Six young boys of the neighborhood learned to swim here the first week, a feat none of them had been able to achieve at the various sea beaches, on account of the surf. It is a certain means of keeping adventurous children at home, and even in colder weather is a popular "proving ground" for toy craft of all types. Shipbuilding has developed amazingly in our workshop, and no investment we ever made returned such dividends in wholesome recreation.

Iceless Refrigerator for Campers

An iceless refrigerator can be made easily and cheaply by any camper. It consists of a cylinder, about 12 in. in diameter and 24 in. long, made of reasonably

heavy canvas. Two wooden disks, 12 in. in diameter, are placed in the cylinder as shown in the sketch. The bottom disk is provided with ventilation holes covered with fly screen, and the canvas is attached to it, preferably with copper tacks. The middle disk, located 15 in. from the bottom, has a deep groove in its circumference, and is held in place by binding the canvas tightly to it with several turns of soft cotton cord, such as

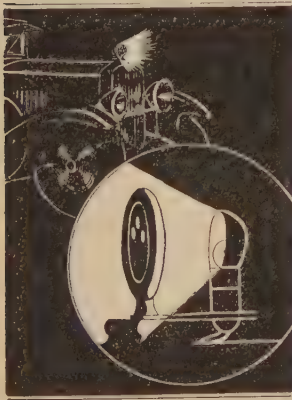


Collapsible, Iceless Refrigerator, Made of Canvas, Keeps Food Cool in Camp

chalk line. The canvas wall of the lower compartment is cut to provide an opening, about 6 by 10 in. in dimensions. Hems are stitched in the top and bottom of the door and a removable wire frame is inserted to hold the door in shape. When the door is closed, an overlapping flap of rubber, cut from an old inner tube, effectively seals all openings against flies. The upper compartment, which is also fitted with a wire ring and a bail at the top, is filled with water. The capillary action of the water keeps the entire canvas moistened, and the resulting evaporation keeps the contents of the lower compartment cool. If the cooler is suspended by two strands of reasonably long rope which are twisted a number of turns, it will revolve back and forth for quite a while by the untwisting and retwisting of the strands, which action will increase the cooling effect considerably. When the wire frame is removed from the door, the cooler collapses into a compact bundle.

Light to Illuminate Motometer

At night, a motometer cannot be seen by the driver unless the car is fitted with cowl lights. It is highly important, however, that the engine temperature should be known at all times, especially during winter driving when a hand-operated shutter is used to regulate the cooling of the motor. It is a simple matter to provide a lamp behind the motometer to enable the driver to see it.



Mount an ordinary dash lamp on a bracket extended from the radiator cap or motometer, and run a length of insulated wire underneath the hood from the lamp to a switch on the

instrument board, then connect the other side of the switch to the live terminal of the ammeter.—Irving C. Valentine, Winsted, Conn.

Manipulating Lawn Mower on Terraces



Driving Reins Provided on Lawn Mower Help Manipulate It on Steep Terraces

A simple hitch for your lawn mower that will help cut the grass on terraces, consists of a length of clothesline to guide the mower. The ends of the rope are tied to the fork of the mower, and the rope is then looped around the handholds, as shown. The user stands on the crest of the terrace and can direct the mower up and down, no matter how steep the terrace may be.—G. H. Dacy, Bethesda, Md.

Easy Method of Replacing Auto Rear End

When replacing a rear end under a car, it is usually quite difficult to lift the driveshaft tube and guide the end of the shaft into the universal joint. If a long plank or piece of timber is put over the rear axle and under the driveshaft tube, the end that hangs over at the back will balance the rear end, so that all you have to do is to guide the end of the shaft into place.

☐ A label paste for bottles can be made by soaking strong glue in strong vinegar, boiling and then adding flour; this adhesive will not decompose.

Homemade Slide for the Children

A slide, practically as good as the coveted one on the school ground, can be made



Simple Wooden Slide, Costing Less Than Two Dollars, Provides Amusement for the Young Children

at home at low cost. Get a board, 1 ft. wide and 10 ft. long, and nail 5-in. strips on both sides. Spruce is the best wood to use for this purpose, but pine also will do. Of course, it is absolutely necessary that the wood is very smooth, to avoid the danger of splinters. After sanding it and removing all the rough edges, apply floor wax. The top part of the side rails should be rounded with a plane. This slide can be adjusted for safety for children of various ages, one end being elevated to the desired height. When not in use, place the slide on the porch or in the garage to keep it out of the sun and rain.—Emma K. Hulburt, Kirksville, Mo.

Safety Cistern Cover

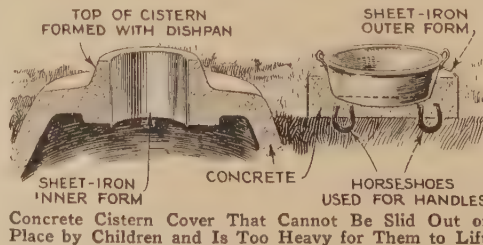
The drawing shows a safety cistern cover which was made by the father to prevent his three-year-old boy, who was more than ordinarily inquisitive, from falling into it. As the cistern wall neared the top of the ground and converged to form the neck, a cylinder of galvanized iron was shaped and put in place for the inner form of the

neck. The soft concrete was brought up to a level all the way around the cylinder, which was left to project above the surface of the concrete as much as the depth of a large dishpan. Additional concrete, mixed quite soft, was then shaped about the top of the neck and the dishpan was turned over it, upside down, and rotated to smooth the concrete. After thirty minutes, it was slowly turned and lifted off. The dishpan was then used for the inside form for the top, which was cast in another short cylinder of galvanized iron, having a diameter 8 in. larger than that of the dishpan.

A plot of ground was leveled off and two horseshoes set in it with the ends projecting about 3 in. The outer form was set directly over them and the concrete was shaped about the pan, which was placed right side up. When cured, the cover fitted snugly over the neck of the cistern. The horseshoes are used to lift the cover off.—Dale R. Van Horn, Lincoln, Nebr.

How to Handle Hot Outboard Motor

It is often necessary to remove an outboard motor from a boat while the motor is still hot. A strap, or rope, looped around the cylinders will facilitate the handling, but as this may burn or scorch if it comes in contact with the hot exhaust pipe, a better method is to obtain a 5-ft. length of motorcycle brake lining and rivet the ends together to form an endless loop. This loop can be shaped to form an "S" under and around the pair of cylinders, and the motor can easily be lifted and carried. Brake lining, besides being exceptionally strong, is composed of an asbestos base and is not easily damaged by heat.



A Boat for the Swimming Pool

By HI SIBLEY

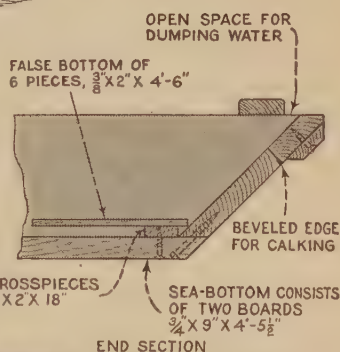
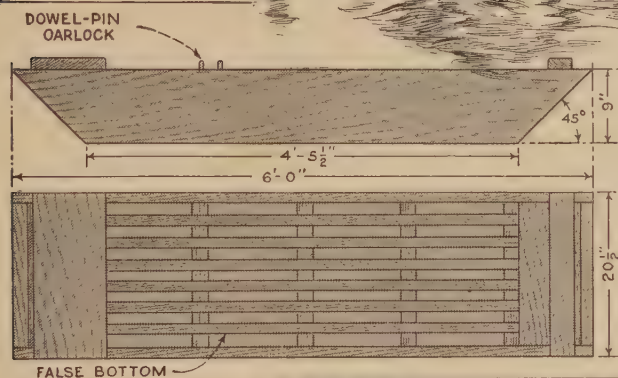
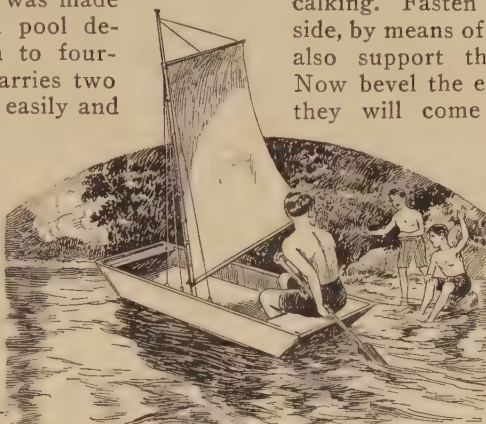
THIS small boat is designed for the boy who does not care to spend much time or money for something to paddle about in. No shipbuilding experience is required to construct this type. The original, shown in the photos, was made for use in the small pool described on pages ten to fourteen, inclusive, and carries two average ten-year-olds easily and comfortably.

If you have plenty of waterway, however, a 7-ft. model is preferred to this 6-ft. design. Unless you have some first-class lumber on hand, you will have to buy it from a

the boat together, but you will find screws much more satisfactory, especially in keeping it watertight under rough usage.

First bevel the edges slightly on the bottom boards, to make space for the cotton calking. Fasten them together, side by side, by means of the crosspieces, which also support the false-bottom slats. Now bevel the ends at a 45° angle, so they will come flush with the end

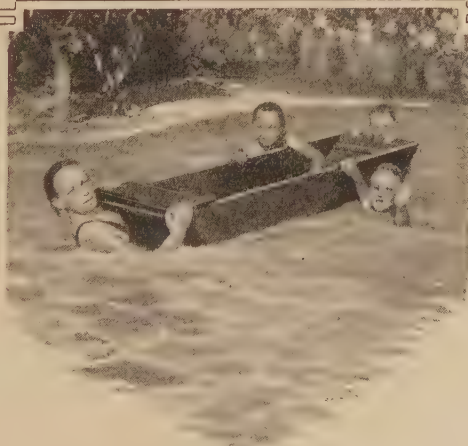
boards. The sides are next screwed to the bottom, the ends of the former first having been sawed off at a 45° angle. Make all screw holes with a hand drill, and take care you do not split the



mill. They will advise you the best wood available in your locality.

For the 6-ft. model, without extras, you will need 28 linear feet of $\frac{3}{4}$ by 9-in. (net) lumber, finished on all sides. The complete bill of material appears at the bottom of page 18.

It is possible to use nails in putting



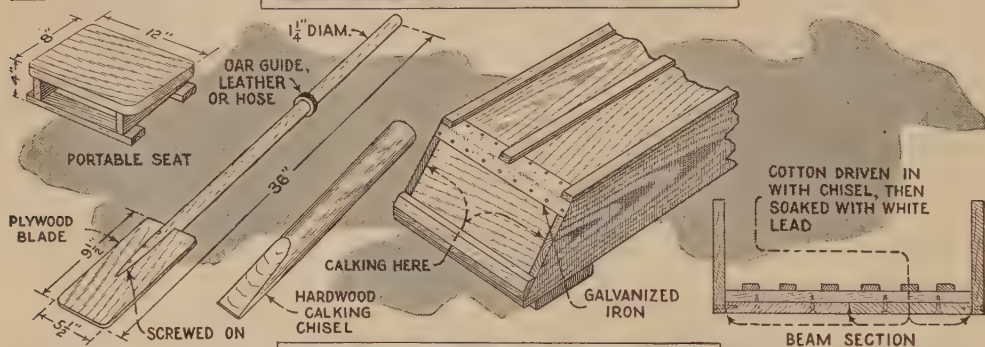
bottom edge of side boards before you install the endpieces to brace them. The end cleats strengthen the entire boat and also serve as bumpers.

Turn the boat upside down and drive in cotton with a calking chisel, as shown. This chisel should not taper to a thin edge, as it will tend to split

and catch in the cotton, pulling it out when you withdraw the chisel. The cotton should be well packed, but not quite flush with the surface of the wood. See that every seam and corner is treated thus. Next apply white lead, sloshing



If you wish to use oars, a pair can be simply made as shown in drawing. These are short enough to use as paddles also. Plywood is selected for the blade because it is not liable to split. However, smooth the edges well with



it well into all the cracks, so that the cotton becomes thoroughly soaked, and give the boat a priming coat inside and out.

When this is dry, nail a strip of galvanized sheet, about 4 in. wide, over each bottom end corner, as shown. This is to prevent scuffing when beaching the boat, and is also added reinforcement. Nail three skids on the bottom over the seams. These will protect the bottom as well as the seams.

Your boat is now ready for the final coat of paint, the color depending on your taste, or whatever you may have on hand. The original was painted a chocolate-brown with green trimmings.

The last job is to lay the false-bottom slats, which add to the appearance if varnished in natural wood. A coat of spar varnish over the entire boat will preserve its appearance.



file and sandpaper, and soak thoroughly with paint so that moisture will not penetrate and loosen the wood. A low portable seat is preferable to one fastened to the gunwales, since it can be moved to the most convenient position and brings the center of gravity low in the boat.

For general purposes, this little boat meets all demands and will survive rough

MATERIAL LIST

- 2 pieces, 3/4 by 9 in. by 4 ft. 6 in., bottom.
- 2 pieces, 3/4 by 9 in. by 6 ft., sides.
- 2 pieces, 3/4 by 9 by 20 1/2 in., ends.
- 2 pieces, 3/4 by 4 by 20 1/2 in., ends.
- 1 piece, 3/4 by 9 by 20 1/2 in., end seat.
- 3 pieces, 3/4 by 3 by 20 1/2 in., end cleats.
- 5 pieces, 3/4 by 2 by 18 in., false-bottom cross-pieces.
- 6 pieces, 3/4 by 2 in. by 4 ft. 6 in., false-bottom slats. (Building lath was used in original.)
- 9 doz. wood screws, 3-16 by 1 1/2 in.

handling. With the addition of a wood keel, about 6 in. deep, it could be rigged up for sailing, having a short mast well forward and a square or leg-of-mutton sail. The paddle could be used as a rudder.

When Out of Gas Try This Kink

Only seldom does an auto run so utterly dry of gasoline that there isn't enough left to carry it one, two or even three miles farther. To make use of the last drop of gasoline in the tank, it is first necessary to push the car to the crown of the road or to jack up the lowest wheel so that the tank will be level. Then remove the drain plug of the tank, allowing a sufficient quantity of gasoline to be drained out. The reason this can be done is that the feed pipe carrying the gasoline to the vacuum tank is usually located just a little higher than the drain plug on the tank and therefore does not carry off all the gas. Gasoline obtained in this way should be strained through a cloth and then transferred to the vacuum tank or, if the amount is very small, directly to the float chamber of the carburetor.—George Alan Strader, Astoria, N. Y.

How to Brighten Gilt Articles

A friend of mine is the owner of a large collection of paintings, many of which have gilt frames. He finds that the gilt tarnishes to such an extent that the frames have to be restored about once a year. Repainting would, of course, solve the problem, but the gilt can also be restored in the following way: Take enough flour of sulphur to make a golden tinge in about $1\frac{1}{2}$ pt. of water, and boil in this four or five bruised onions. The liquid is strained and ready for use as soon as it cools. Simply apply the liquid to the gilt surface and allow to dry.—V. Johnson, Spokane, Wash.



Auto Skid Chains, Packed in Oil-Soaked Sawdust in Oilcan, Are Safe from Rust

Stowing Away the Skid Chains

An old oilcan, with one side cut away and the edges turned back to prevent cutting the hands, makes a good receptacle for storing the auto skid chains. It is filled with oil-soaked sawdust which keeps the chains free from rust. Old crankcase oil can be used. The handle of the can is left on, to facilitate lifting and moving.

Improved Focusing Cloth

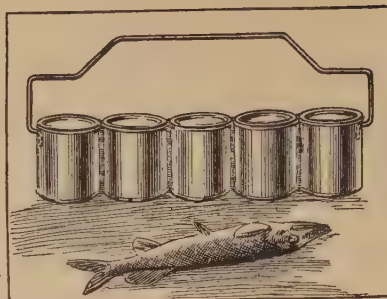
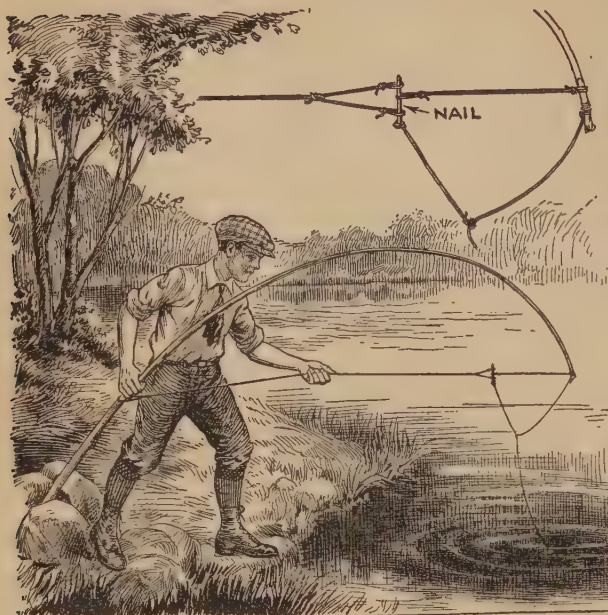
Besides admitting reflected light from the ground, a focusing cloth of the ordinary kind is very inconvenient to handle

in the wind. I improved my cloth by sewing two edges together and inclosing rubber bands in ends. One end is snapped over the back of the camera and the other end over the photographer's head, and in this way the cloth is much handier and more efficient than it was before.—Charles M. Doten, Plymouth, Massachusetts.



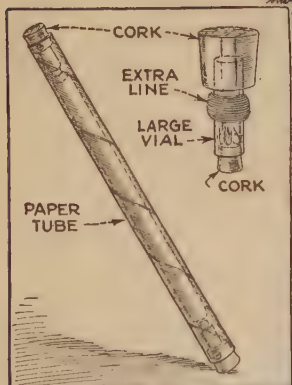
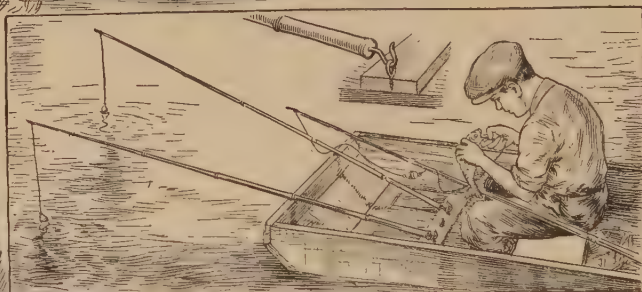
Tubular Focusing Cloth Fitted with Rubber Bands, to Hold It in Place

Practical Kinks for the Fisherman

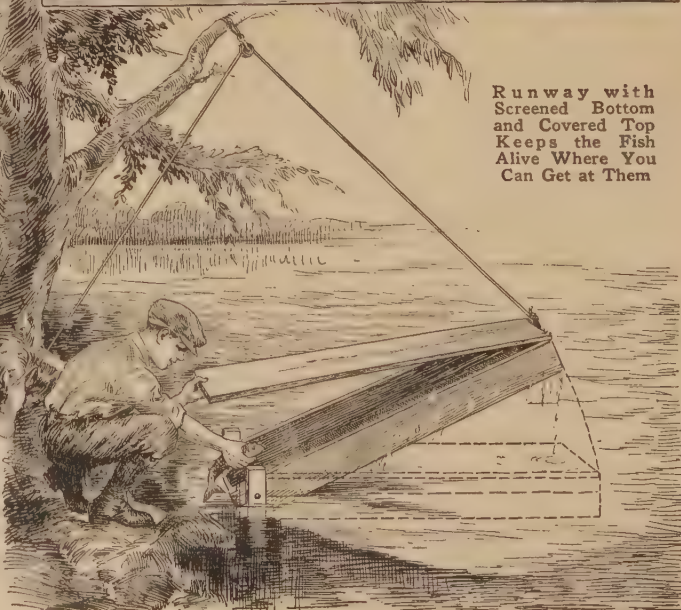


Handy Fishing Kit Made by Soldering Together Several Tin Cans; Left, Rigging Up the Set Rod to Strike the Fish—a Good Bite Makes It Spring

A Screwhook and Eye Will Hold Your Poles—a Kink Which Is Well Worth While When the Fish Are Biting Fast



Mailing Tube, Varnished, Forms Case for Sectional Rod, While Vials on End Corks Hold Sinkers, Hooks and Line



Runway with Screened Bottom and Covered Top Keeps the Fish Alive Where You Can Get at Them

Make This "Tim Turner" Windmill

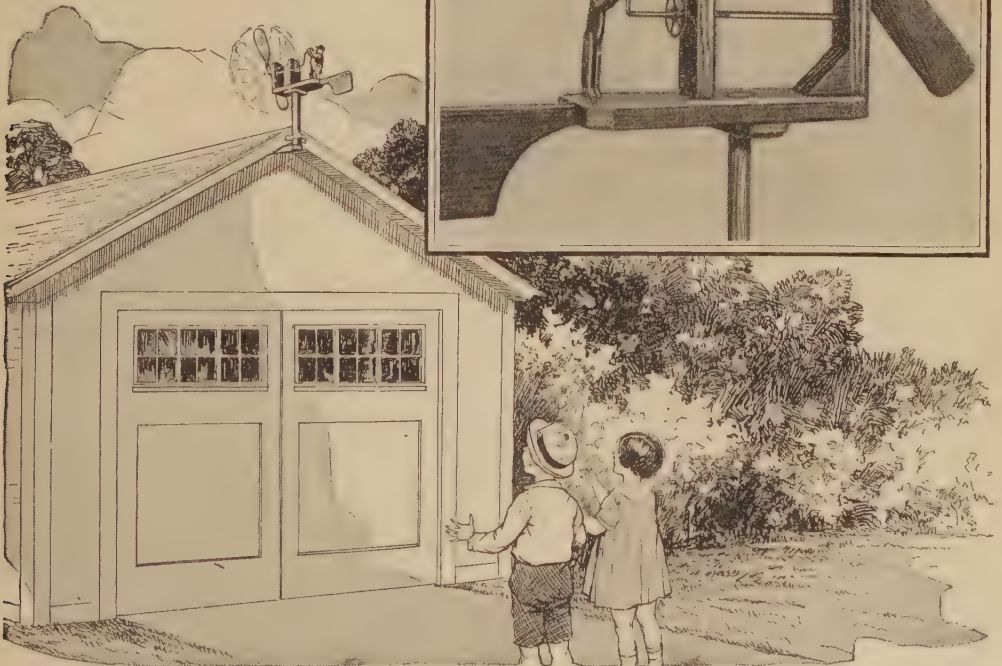
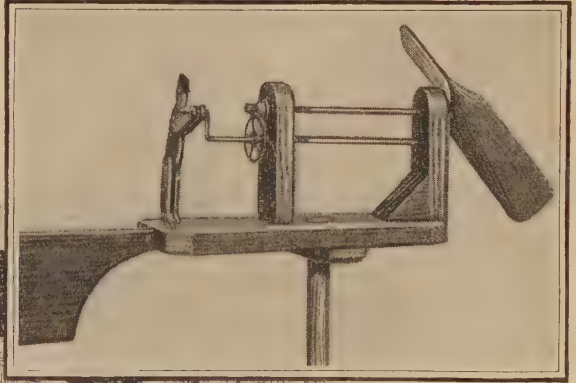
By L. R. BROWNE

THE novel "Tim Turner" windmill shown in the illustration consists of the following parts: 1 piece of $\frac{5}{8}$ -in. wood, 4 by 10 in.; 1 piece of 1-in. hardwood, 1 by 12 in.; 1 piece of $\frac{1}{8}$ -in. hardwood, 4 by 12 in.; 1 piece of $\frac{3}{16}$ -in. brass or iron rod, 20 in. long; two alarm-clock gears; one brass bushing, $1\frac{1}{4}$ in. long and having an inside diameter of $\frac{3}{8}$ in.; one $\frac{3}{8}$ -in. bolt, 4 in. long; two $\frac{3}{16}$ -in. washers, and two cotter pins.

The 4 by 10-in. piece is used as a base. The two uprights that support the shafts are made of oak or other hardwood, and are fastened to the base with two long wood screws, driven up through the base. Drill two $\frac{3}{16}$ -in. holes through each upright, the upper hole about 1 in. from the top and the position of the lower hole being determined by the size of the gears used. These holes are to hold the shafts and must therefore be in alinement. The propeller is made of strong straight-grained wood, 1 in. square and 12 in. long. Start

to form each blade as near the center of the piece as possible, leaving a square portion uncut at the point where the shaft enters it. The vane is attached by cutting a notch, $\frac{1}{8}$ in. wide and 2 in. deep, in the center of the rear part of the base, as shown. The vane must fit in the notch snugly; it is glued in place and then nailed.

By laying out $\frac{1}{2}$ -in. squares on a piece of paper, as shown in Fig. 2, a pattern for the man can be easily made. Cut the figure out of $\frac{1}{8}$ -in. hardwood with a coping saw. The arm and leg pivots are made of small nails, bent over at each end after placing. Leave the joints rather loose and free, to allow easy motion. To make the sharp right-angle bends, in the $\frac{3}{16}$ -in. shaft, which form the crank, file notches in the rod about halfway through, and bend toward the notches. Two of these



When the Propeller of This Unusual Windmill Is Driven by the Wind, the Wooden Figure Appears to Be Cranking the Propeller by Hand



Make a Filipino "Yo-Yo"

By HI SIBLEY

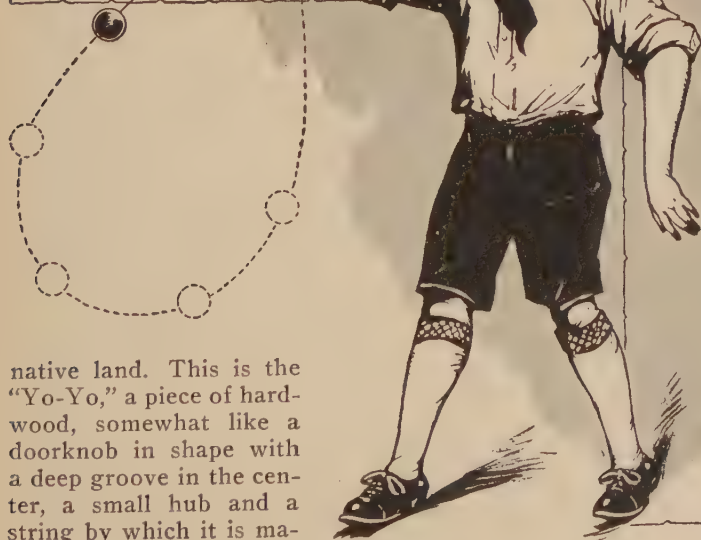
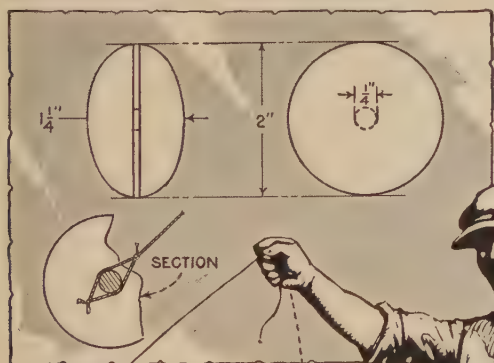
WITH the sole object of amusing himself, a Filipino boy of Santa Barbara, Calif., innocently started a fad that has swept the Pacific coast and is spreading fast to the rest of the country.

The Manila youth had merely revived a toy that is said to have originated in his

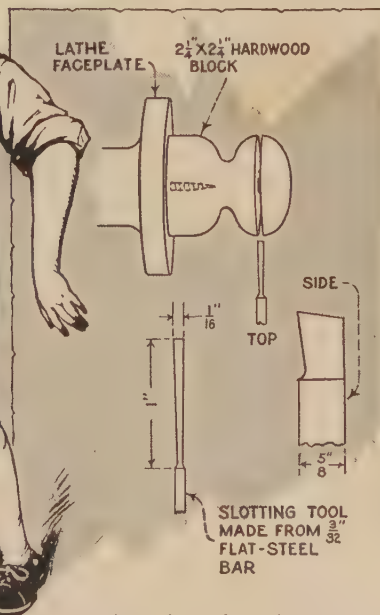
nipulated. A loop in the string is slipped over the middle finger of the right hand, the cord is wound around the hub and with a deft outward thrust the Yo-Yo is released. When it has reached the end of the cord, the whirling motion rewinds it back to the hand. With experience, a boy can describe all manner of curves, bringing the agile ball back to his hand in graceful sweeps.

A suggestion for making this popular toy is shown in the accompanying diagrams. Hardwood is preferred to soft because of its weight. Maple is very satisfactory, or any wood that does not split easily.

With access to a small lathe, the



native land. This is the "Yo-Yo," a piece of hardwood, somewhat like a doorknob in shape with a deep groove in the center, a small hub and a string by which it is ma-



construction is simple. Screw a block of wood, $2\frac{1}{4}$ in. square and about $2\frac{1}{2}$ in. long, to the lathe faceplate. Turn down roughly to the shape required and groove with a special cutting-off tool, made up by grinding or filing a flat steel bar to the dimensions given. Sandpaper the exterior as well as the slot before cutting off the Yo-Yo completely. Be sure that the groove is exactly in the center; otherwise the toy will wobble and perform erratically. A coat of stain and varnish makes a

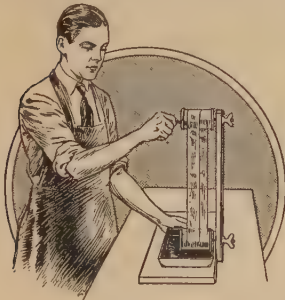
very neat job. Some of the youngsters have very elaborate Yo-Yos, beautifully inlaid with various woods.

The conventional Yo-Yo string has only two strands, which are divided and tied loosely over the hub, as shown in the section. If tied tightly the toy will have a tendency to jerk when it reaches the end of the string.

Any fairly hard string will do, and performance will be improved by rubbing the string across paraffin or candle wax.

Tin-Can Developer for the Darkroom

Developing films can be made easy by using a developer like that shown in the



drawing. It is made of two tin cans, about 6 in. long and 3 in. in diameter, and four tin disks, 4 in. in diameter. First the covers are soldered to the cans, making

a smooth joint, and then the disks to the end of the cans so that two spools are formed with a $\frac{1}{2}$ -in. flange around them. Punch a hole through the disks and the ends of the cans, in the center, to receive $\frac{1}{8}$ -in. stove bolts and allow the spools to turn easily. The spools are mounted on a support consisting of a 12 by 12 by 2-in. base to which a 1 by 1 by 30-in. wooden upright is nailed or screwed as indicated. A $\frac{1}{8}$ -in. slot, 28 in. long, is cut in the center of the vertical piece so that the spools can be set various distances apart to accommodate films of different lengths. In mounting the spools, a washer is slipped over the bolt, the latter passed through the slot and the assembly held by a wing-nut as shown. In use, the ends of the film to be developed are pinned together and it is slipped over the spools. The tray containing the solution is set on the base, the lower spool is pushed down so that the film dips in the solution, and the upper spool is adjusted until the film will be fairly taut. A pin soldered to the upper spool facilitates turning of the film. Of

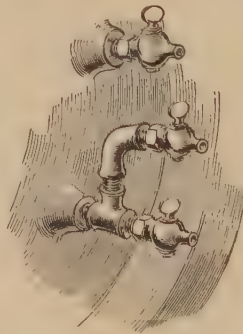
course, the emulsion side should be on the outside.—G. Everett Van Horn, Milton, Wisconsin.

Rubber Tires for Farm Machinery

The hardest wear on wheeled farm implements occurs when they are hauled over country roads. Many of the wheels are nearly the same diameter as truck wheels, and it is possible to get second-hand solid tires that have done their duty in truck service, and which will fit the wheels of the implements. The latter will last much longer when so equipped.—K. E. Corliss, Langley, Wash.

Gauge for Ford Crankcase

I found it rather difficult to determine when the oil level in my Ford crankcase was halfway between the top and lower petcocks. The difficulty was overcome by



removing the lower petcock and installing a tee as shown in the illustration, the petcock being attached to the tee. Into the side opening of the tee a short nipple was screwed, and an elbow, another short nipple and a petcock were then attached as indicated. To make the drawing clearer, the petcocks are shown vertical, although when they are installed the handles should be horizontal, to make it convenient to open them with a long-handled wrench.—Arnold Fuog, Chicago.

The FIGHTING SALURIANS

By

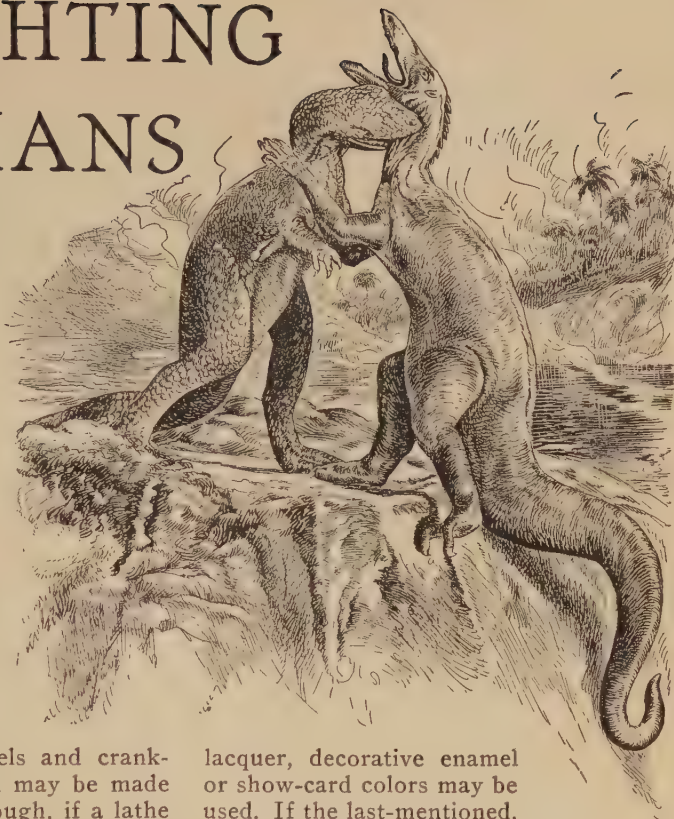
H. C. Mc KAY

THESE fighting saurians will appeal to the youngster who is just learning of the monsters of the Jurassic age. The eccentric motions and bright colors, together with the strange form, all go to make up a toy designed to appeal to children of all ages.

The entire toy is made of thin wood, $\frac{3}{8}$ in. three-ply paneling being very good, as it does not warp or split easily. The wheels and crank-shaft bolsters, or bearings, may be made of the same material, although, if a lathe is at hand, turned wheels may operate more smoothly. If the paneling is used for the bolsters, two thicknesses should be used, giving each bolster a $\frac{3}{4}$ -in. bearing surface.

The first step is to fretsaw the two saurians No. 1 and No. 2. It will be noticed that these outlined figures are not separated into individual members, but the whole is given in one figure. By the use of the guide lines, however, the legs may be drawn separately, while the figures give a good idea of the assembly. In both cases, one body and two pairs of legs will be needed.

As the most important point is to have all joints work smoothly, the decorating is best done before assembly. For this purpose, either



lacquer, decorative enamel or show-card colors may be used. If the last-mentioned, a coat of clear varnish should be applied later as these colors are not waterproof and are inclined to rub off when dry.

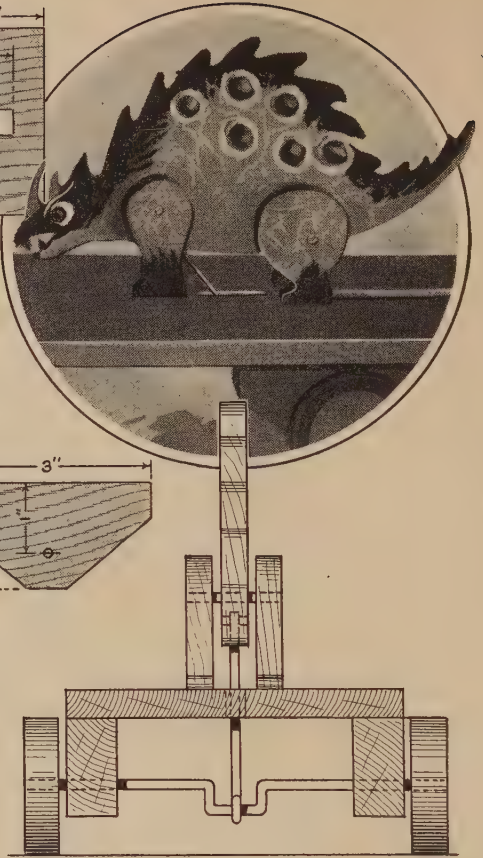
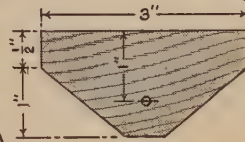
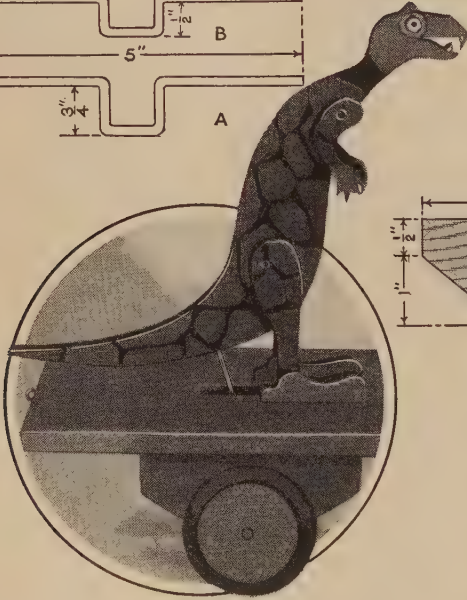
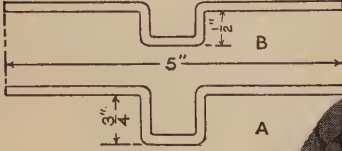
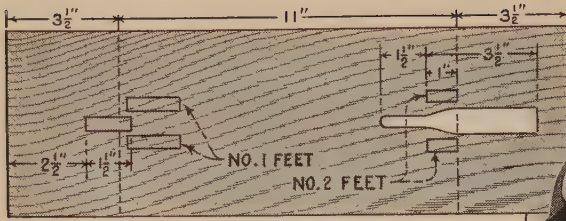
The exact coloration is left to individual fancy, as we have no means of knowing what colors these reptiles actually were. With our present knowledge of protective coloration and of the blotchy patterns of many present-day reptiles, we may assume that the abdomen was a yellowish-green,

or greenish-yellow, with a varicolored and blotched pattern on the back and sides. The drawings indicate the colors given the original models.

The next step is to make the carriage.

The bed measures 5 by 18 in. and is cut out as shown. The opening between the feet of No. 1





(the taller figure) measures about $\frac{3}{16}$ in. wide, but as this opening is for the wire drive rod to pass through, the width need not be exact. The opening for No. 2 is quite different. The larger end of the opening allows the tail to drop below the level of the bed when the animal rises. This opening is $\frac{1}{2}$ in. wide. The narrow end is for the No. 2 drive rod and is about $\frac{3}{16}$ in. wide. If the figures are drawn exactly as shown and placed upon the bed as indicated, they will work, but before fastening them, it would be well to make a trial to see that all action is smooth.

The bolsters, four in number, are made as shown in the detail; of the two cranks, made of stiff wire, A is for No. 1 drive and B for No. 2. Note that these cranks are made for use with 2-in. wheels. Mount the bolsters on the sides of the carriage with a 2-in. space between the end of the bolster and the end of the carriage. This places the axle (crank) line $3\frac{1}{2}$ in. from the end. The holes through the bolsters

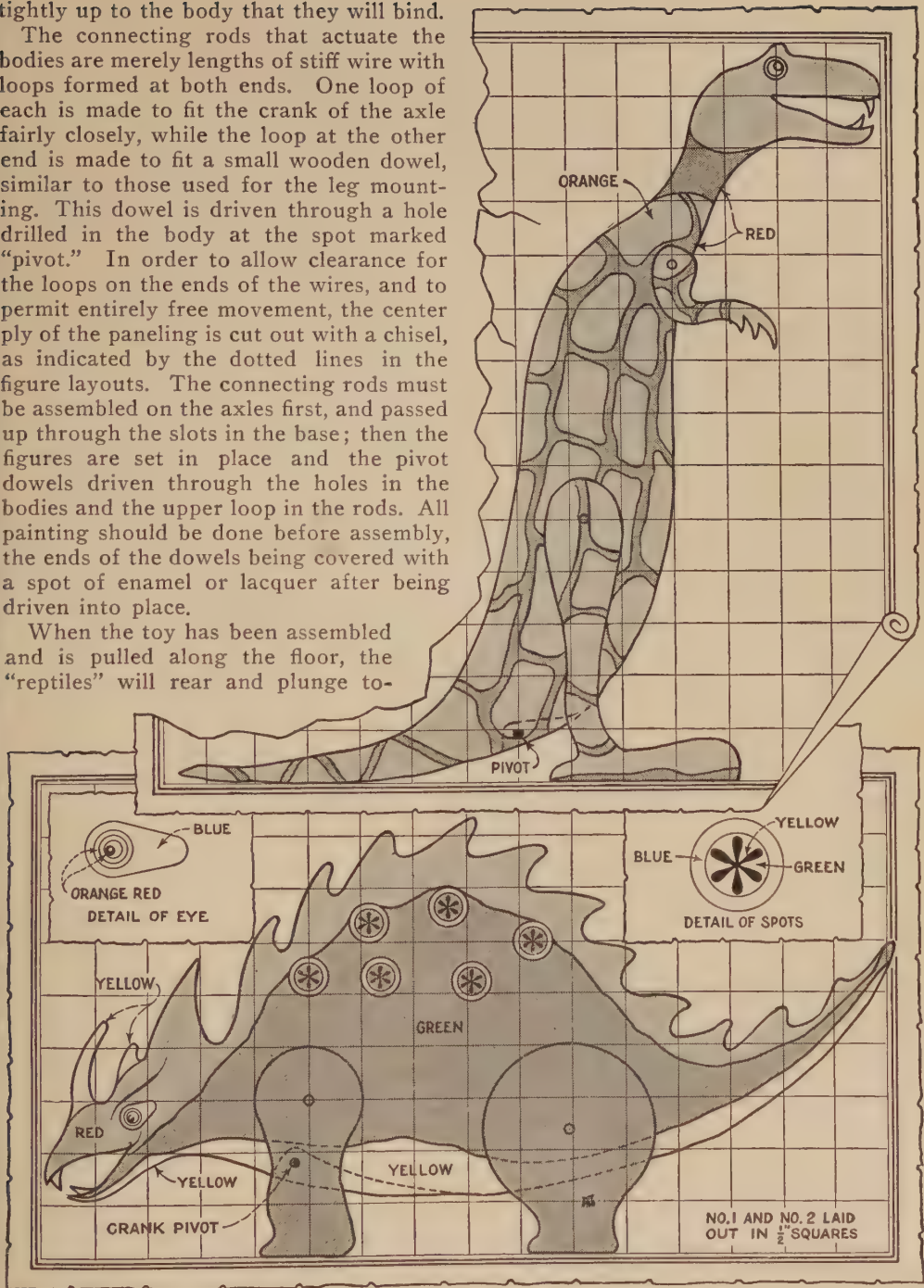
should be from $\frac{1}{4}$ to $\frac{1}{2}$ in. larger than the diameter of the crank wire. The holes in the wheels are about $\frac{1}{4}$ in. smaller than the crank wire, requiring a drive fit. This gives the propelling traction.

The legs are assembled with the bodies by means of small wooden dowels. For this purpose, the small wooden sticks upon which lollypops are mounted will serve excellently. The holes drilled through the bodies are a trifle larger than the sticks, while the holes in the legs and arms are drilled so as to be a drive fit. This gives a firm support, while permitting free movement. The two arms of No. 1 may be glued solidly to the body if the maker prefers, but the movement is more natural if they are permitted to swing free. When attaching the legs to the body, it is an improvement to slip a small washer over the dowel, on each side, before driving on the leg or arm, although this is not essential. If washers are not used, be careful not to drive the limbs so

tightly up to the body that they will bind.

The connecting rods that actuate the bodies are merely lengths of stiff wire with loops formed at both ends. One loop of each is made to fit the crank of the axle fairly closely, while the loop at the other end is made to fit a small wooden dowel, similar to those used for the leg mounting. This dowel is driven through a hole drilled in the body at the spot marked "pivot." In order to allow clearance for the loops on the ends of the wires, and to permit entirely free movement, the center ply of the paneling is cut out with a chisel, as indicated by the dotted lines in the figure layouts. The connecting rods must be assembled on the axles first, and passed up through the slots in the base; then the figures are set in place and the pivot dowels driven through the holes in the bodies and the upper loop in the rods. All painting should be done before assembly, the ends of the dowels being covered with a spot of enamel or lacquer after being driven into place.

When the toy has been assembled and is pulled along the floor, the "reptiles" will rear and plunge to-



ward each other with a swinging motion. The weight and method of pivoting No. 2 will cause a certain amount of slip which

gives it an awkward, shambling, irregular motion that is much more realistic than would be a uniform up-and-down motion.



Cardboard Device Used by Photographer for Finding Best Viewpoint

Finder for Photographs

I have found the illustrated device useful in selecting a viewpoint for any particular landscape or object to be photographed. A card is cut to the same size as the plate or film used in the camera, and a rectangular hole, about two-thirds the size of the card, is cut out with a sharp knife or razor blade. At the inside edge of the opening thus formed a small cord is attached as indicated, and a number of knots are tied at intervals on this cord, the distance from the edge of the hole to the knots being equal to two-thirds of the focal lengths of the various lenses used on the camera. The landscape or object to be photographed is viewed through the opening of the card and the distance of the eye from the frame is varied by holding different knots against the upper part of your cheek, just under the eye, until the frame includes the desired picture. A lens of corresponding focal length is adjusted to the camera. On my camera, I use lenses of $4\frac{1}{2}$ to $16\frac{1}{2}$ -in. focus. The outside dimensions of the card enable one to carry it with the plate holders.—W. H. Wilcox, Tacoma, Wash.

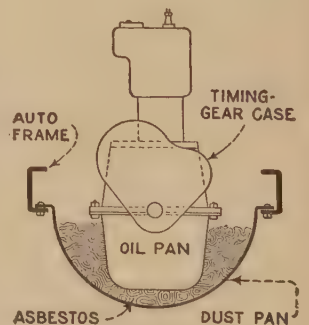
Dry-Cleaning Mixture

An emulsion of gasoline and water is much used by dry cleaners for removing grease, tar and paint spots from clothing. It is in the form of a thick, white sirup, which evaporates entirely and is not injurious to any fabric or color. This emul-

sion can be prepared as follows: Dissolve, in 1 qt. of boiling water, $\frac{1}{2}$ oz. of pure castile soap and $\frac{1}{4}$ oz. of gum arabic. Allow this to cool, and then add 1 oz. glycerin, 1 oz. strong ammonia water, $1\frac{1}{2}$ oz. chloroform, and 2 oz. sulphuric ether. Shake well, and pour enough of the mixture into a quart bottle to fill it for $\frac{3}{4}$ in. On top of this pour gasoline to raise the level $\frac{1}{4}$ in., and shake until creamy. Repeat the addition of gasoline, shaking each time, until the bottle is full. The cleaning mixture will then be ready for use, and may be applied with a rag or with a small brush. If, on adding the first lot of gasoline and shaking, the mixture does not become emulsified, too much gasoline has been added. In this case, allow the mixture to stand for a few minutes and pour off the excess gasoline, which comes to the top. Shake well, and add a smaller quantity of gasoline. When the bottle is half full, larger quantities of gasoline may be added at a time. It is interesting to note that the more gasoline is added, the thicker the emulsion becomes, and if the addition of gasoline and the shaking is prolonged, a semisolid jelly is formed, which will not run from the bottle. Keep the emulsion away from open flames.

Conserving Motor Heat in Zero Weather

Fitting a shutter in front of the radiator of your car is highly recommended to keep the heat of the motor at an efficient operating temperature, and the provision of cardboard or asbestos strips inside the lower part of the hood to close the ventilating slots, is also advisable. Besides this you will find that asbestos "fluff," which is used for steam-pipe packing and is obtainable at almost any mill-supply house, provides considerable insulation when stuffed between the dust and oil pans of your car, as shown in the drawing.



—R. P. Cole, Paterson, N. J.

Boomerang Throwing is Great Sport

by Keenan
H. Ward

ZIP! Away it goes, skimming the surface of the ground for a distance of 250 ft. or more, and then, rising like a bird in its flight, it wheels and comes hurtling back to the thrower, landing almost at his feet. Believe it or not, there's real fall sport in boomerang throwing.

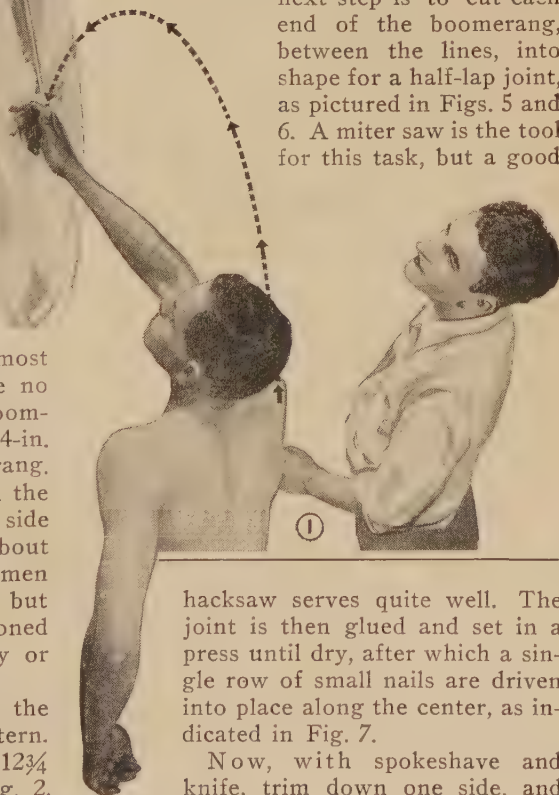
The boomerang comes from Australia, where the flat country makes an ideal arena for their manipulation. The little brown Bushmen of the Arunta tribe, who depend on them almost entirely for hunt and defense, make no less than twenty different forms of boomerangs, ranging all the way from a 14-in. bird stick to the heavy 4-ft. war boomerang.

Most Australian boomerangs are in the shape of an obtuse triangle, flat on one side and convex on the other, measuring about 2½ ft. from tip to tip. The brown men use acacia wood in their construction, but your homemade one can be fashioned quite nicely from a piece of hickory or second-growth ash, ⅝ in. thick.

In making your own boomerang, the first step is to map out the paper pattern. Do this on a sheet of paper, 29½ by 12¾ in. The paper plan is shown in Fig. 2.

Only a rough adherence to the plan is necessary in order to insure a successful boomerang. Note that the width of the boomerang arms, near the angle, is 2 in., while they narrow down to 1⅞ in. at the rounded extremities.

Cut out your paper model and draw two lines across it in positions somewhat similar to those shown in the lower drawing. Now, place your pattern on the wood stock and trace out each half of the boomerang, as in Fig. 3, the portion of the pattern between the two lines being part of both halves. After the outline has been penciled in, take a keyhole saw and cut out the two portions, as shown in Fig. 4. The next step is to cut each end of the boomerang, between the lines, into shape for a half-lap joint, as pictured in Figs. 5 and 6. A miter saw is the tool for this task, but a good



hacksaw serves quite well. The joint is then glued and set in a press until dry, after which a single row of small nails are driven into place along the center, as indicated in Fig. 7.

Now, with spokeshave and knife, trim down one side, and

one side only, of your boomerang to a convex shape, as shown in Fig. 8. In shaving, only the sharp edge is taken from the wood at the center in order to leave the joint almost full strength, but the remaining part is cut down to a feather line at the edge while retaining the full $\frac{5}{16}$ -in. thickness at the center line.

Additional nails are then driven into the joint, and aluminum reinforcing strips, cut to shape with tin snips, are nailed to the center and tips of the boomerang on the flat side, as shown in Fig. 9.

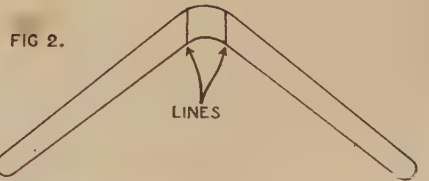
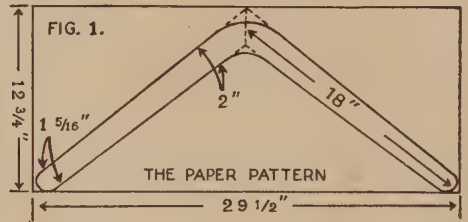
The final operation, Fig. 10, consists in giving the whole thing a coat of stain or varnish. A bright color paint should be used instead of stain if you are contemplating throwing in deep grass, in order to make the boomerang more distinguishable where it falls.

And now to the throwing. The average person thinks that the throwing of a

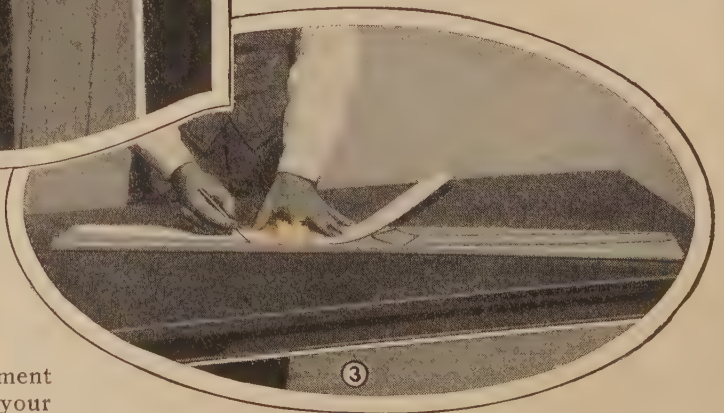
own far more readily than the pulling of a forty-pound longbow.

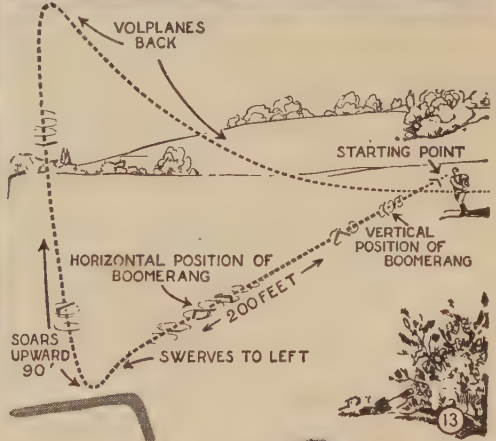
The first rule is that the boomerang must always be thrown against the wind. It is against the wind only that the magic stick is self-retrieving.

So, facing the wind, you hold the boomerang in your right hand with the rounded side inward; that is, the round side should be the left side of the boomerang, when held in throwing position by a right-hand thrower. Holding firmly to one end, bring the stick over your head until you reach the position shown in Fig. 11. Then, bringing the arm forward in a straight overhand swing to the position shown in Fig. 12, release the stick with a short upward jerk of the hand, somewhat like that used in cracking a whip. This is important. Without this sharp jerk, the boomerang gets off to a slow spinning start and will not revolve fast enough to



boomerang is something which can only be acquired through long and continuous practice, but that idea is entirely erroneous. Throwing the curving stick is an accomplishment which you can make your





make the return journey; with the snap correctly done, the



The parabolic flight of the boomerang is a beautiful thing to witness. Although the throw is generally as described, the magic stick can be made to perform a score of other graceful arcs. A slight variation of the snap, a small deflection of the throwing angle, and the boomerang can be made to shoot inward with terrific swiftness, curve outward in a lazy arc, or shoot upward in spinning flight. Almost any object, be it a rabbit hiding behind a stump or a pheasant on the wing, is a fit mark for the flying stick.

After some proficiency has been gained in directing the flight of the boomerang, you can erect a target consisting of a burlap sack filled with straw and aim your stick at this. You will soon acquire sufficient skill to score a hit fully half the time at a distance of from 40 to 60 yd.

And if you do miss, well, back it comes, like a trained eagle wheeling in the breeze!

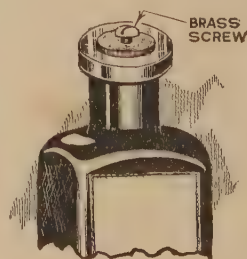
boomerang will fairly zoom forward, spinning so rapidly that it is apparently transformed into a circular plate of wood of a diameter equal to a straight line joining the two ends.

That's all there is to it. The average beginner learns boomerang throwing somewhat like this: He pitches a few into the ground; he sails anywhere from two to thirty times with no visible signs of a return journey; and then—success, after which the knack is very seldom lost.

In a successful boomerang flight, the missile will swoop straight forward in a nearly vertical plane for a distance ranging all the way from 100 to 350 ft. As it covers this distance, it changes to an almost horizontal plane, and then, swerving to the left, it soars aloft like a bird and then comes swooping back in a long vol-plane, to land at the thrower's feet.

Removing Cork from Bottle

It often happens that corks in bottles and jugs are shrunk or are pushed down into the neck so far that it is difficult to remove them. An



easy and effective method of overcoming this trouble is to drive a screw-eye or wood screw into the cork as indicated. With this arrangement, the cork can, in most

cases, be removed without any trouble.—James F. Hobart, Chicago.

The Magic Ballroom

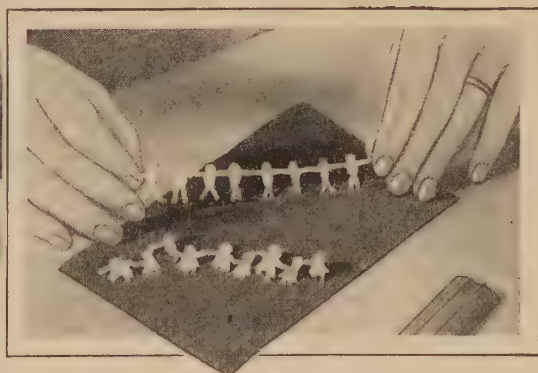
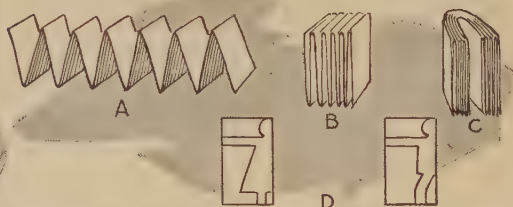
THE MAGIC ballroom is a simple toy which will provide endless enjoyment to children, and to some of the grown-ups also. The device is based upon principles of static electricity well known to all of us.

The ballroom proper is a shallow box. One of the cedar cigar boxes intended for 25 cigars makes an excellent box for this purpose. In addition, all that is needed is a small quantity of tissue paper, some thin card, a sheet of celluloid as large as the box, paste and tacks.

Two strips of tissue paper are cut about

$\frac{3}{4}$ in. wide and 4 or 5 in. long. These strips are folded back and forth as shown in the illustration, at A. When both strips have been thus folded, the resulting square packets B are folded in the center, as at C, and one each cut as shown in the diagrams at the right and left of D. When the strips are unfolded, you will have two rows of tiny tissue-paper dolls holding hands. These will be of the two shapes shown, one strip of boys and one of girls.

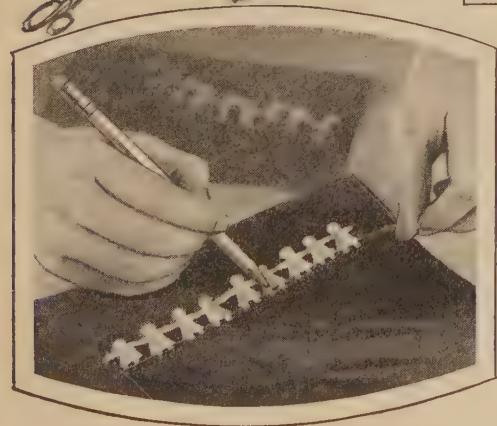
One edge of the thin card (black has been used in this case, in order to show up better in the illustrations) is given a coat of paste, and the feet of one strip of dolls



Upper Left, Folding the Tissue; Above, the String of Dolls after Cutting Out; Left, Pasting the Dolls to the Edge of the Thin Card

pasted upon this card, the feet extending over the card about $\frac{1}{8}$ in. This is to provide the feet with a certain amount of weight to hold the figures upright.

With sharp scissors, cut this narrow strip from the edge of the card. Then the card is carefully cut along the outlines of the feet. When this is done, each foot will have a piece of cardboard about $\frac{1}{8}$ in. square pasted upon its extremity. The strip is now held above the box and the hands of the dolls cut apart, allowing each





Upper Right, Cutting the Dolls from the Strip; Below, Tacking the Celluloid Cover in Place; Left, How the Dolls Are Made to Dance in Their Ballroom

doll to fall into the box. This is done because the dolls are so fragile that they are handled only with difficulty.

About five boy and five girl figures will be enough for the box. The sheet of celluloid is now fastened to the top edges of the box with fine tacks or nails. This completes the toy, unless the constructor desires to ornament the outside of the box. The simplest way to do this is to stain the box, then glue on a cut-out of a couple dancing, and give the box a coat of varnish or clear lacquer.

If the finger tip, or a piece of silk held in the fingers, is rubbed across the celluloid once or twice, the dolls will jump up-

right, and if the box is then tapped gently with the fingers, the dolls will dance about in a lively manner. As the charge of electricity generated becomes dissipated, the dolls will waver and drop to the floor of the box, but a single stroke of the finger will bring them upright again, some of them leaping up and hanging suspended by their heads.

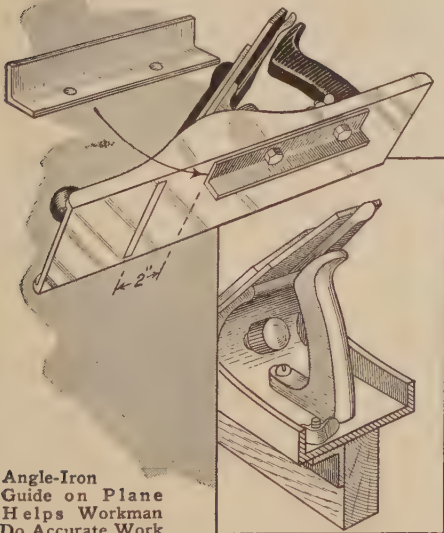
Thawing Out Frozen Auto Radiators

The quickest way to thaw out a frozen auto radiator is to pour hot water on the outside. Do not make the mistake of pouring the hot water into the radiator, as this will have little or no immediate effect. Pour the water around the tubes after having opened the drain cock. If steam is available, it can be used to greater advantage in the same way, but if there

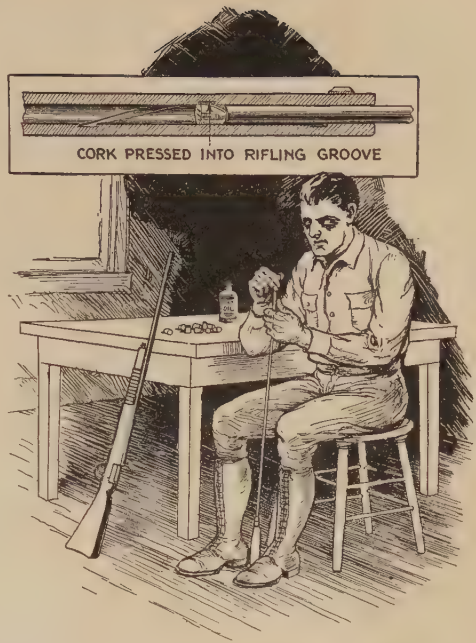
is no steam or hot water, throw a heavy blanket or cloth over the radiator and run the motor slowly, preferably with the fan disconnected. Take care, however, that the motor does not get too hot, or serious damage may result. If the sediment bulb under the gasoline tank becomes filled with water and freezes, soak a heavy piece of cloth in hot water and wrap it around this part until it thaws out. If water collects in the carburetor and freezes, the carburetor should be treated in the same way. Trouble of this kind causes difficult starting in cold weather, and a hot bath, such as just described, will sometimes do a lot more good than hours of cranking.—Glen F. Stillwell, Collinsville, Ill.

Detachable Plane Guide Aids in Squaring Work

In order to plane the edge of a piece of wood at perfect right angles to its face, the guide shown in the illustration will be found useful. It consists of a length of angle iron attached to the underside of the plane and parallel to its edge. Two holes are drilled through the guide and through the bottom of the plane to accommodate screws, which are held in place securely with wingnuts. The ends of the guide are slightly rounded to prevent marring the work. By tilting the blade the edge of the work can be cut at a slight bevel.—Albert Armyn, Astoria, N. Y.



Angle-Iron Guide on Plane Helps Workman Do Accurate Work



Rifles Can Be Thoroughly Cleaned by Pushing Corks through Them

Small Corks Used for Cleaning Rifle Barrel

Small corks make an excellent cleaner for rifle barrels. They should be slightly larger than the bore of the rifle and the larger end is pushed in first. The pressure of the ramrod against the cork will expand it slightly so that the rifling groove will be cleaned too. It has been found best to enter the cork at the breech end of the gun if its design permits. Small corks that are suitable for .22-caliber rifles, can be bought for a few cents, and larger ones for larger-size guns do not cost much more at groceries or drug stores.—Dick Cole, Los Angeles, Calif.

How to Clean an Electric Percolator

It is an easy matter to clean the inside of an electric coffee percolator. Put four heaping tablespoonfuls of salt in the coffee compartment, and fill the percolator with about as much water as when making coffee. Then put on the fire to boil and let the percolation go on for some time. This will remove the deposit on the interior and it will be found also that any grains of coffee which may have lodged in crevices have been loosened.

Make and Sail

by R. Gregg

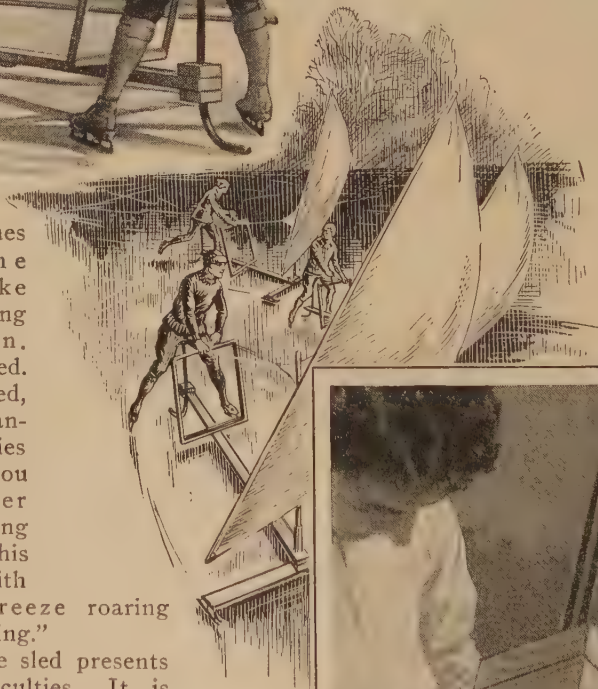


HERE he comes —there he goes! Just like that! Like saying Jack Robinson. That's the ice sled. If you want speed, if you have a leaning toward niceties in navigation, if you want real winter sport, try scudding to leeward in this midget iceboat with a spanking breeze roaring against the "rigging."

Making the ice sled presents no serious difficulties. It is merely a matter of wood, bolts and sail—and there you are! First of all, the backbone. This is an 8 ft. 5-in. length of 2 by 4-in. pine. Two short pieces of similar material, one on either side, are bolted or securely nailed to the backbone, and a $1\frac{1}{16}$ -in. hole is bored through the three pieces, as shown in Fig. 2. This hole is intended to take the rudder, which is a 3 ft. 3-in. length of 1-in. pipe, the lower 9

in. of which has been bent at right angles to the main stem. This length of pipe is slipped down through the hole just drilled, and secured on either side by means of 1-in. collars, as shown in Fig. 1.

So much for the rudder stem. The front portion of the boat consists of two old skates which have been bolted to either end of a 3-ft. length of 6-in. wide siding, as shown in Fig. 3. Through the center of this piece, bore a $2\frac{1}{16}$ -in. hole with an expansion bit, and around the underside of the

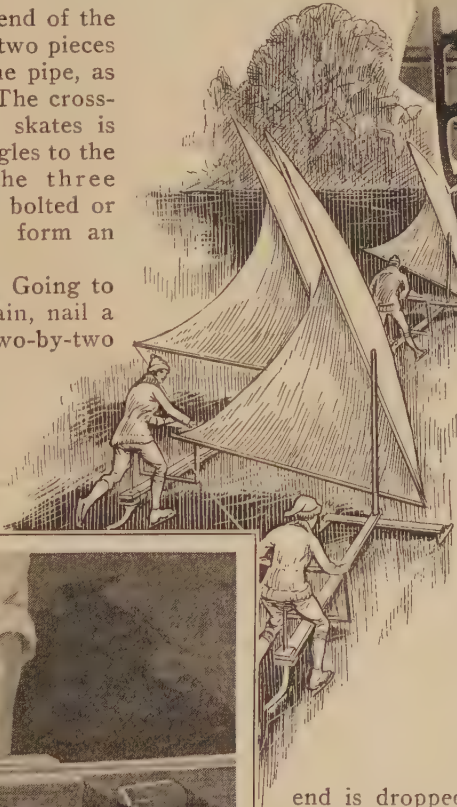
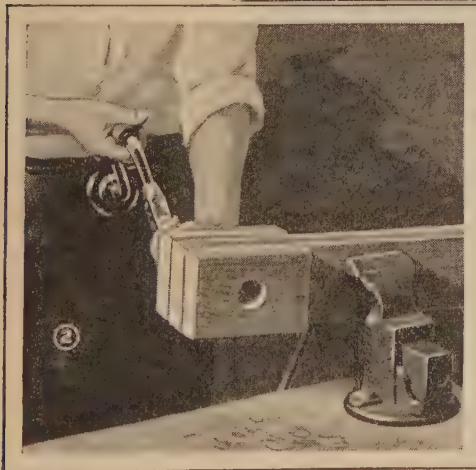


Your Own Ice Sled

hole screw on a 2-in. blind floor flange, as shown in Fig. 4.

Now, slip a 10-in. length of 2-in. pipe through this hole, screwing the pipe into the flange on the underside of the crosspiece, as shown in Fig. 5. A $2\frac{1}{8}$ -in. hole is then bored through a 6-in. piece of two-by-four and also through the front end of the backbone, and the two pieces are slipped over the pipe, as shown in Fig. 6. The crosspiece carrying the skates is then set at right angles to the backbone, and the three pieces are securely bolted or spiked together to form an immovable joint.

So far, so good! Going to the rudder end again, nail a 15-in. length of two-by-two crosswise to the backbone and about 3 ft. from the rear end. To each end of the crosspiece, nail a



piece of 2-in. half-round molding, 20 in. long, and between these two pieces,

at the top, nail a handle of 1-in. dowel stock, as shown in Fig. 7. A large nail is hammered into place through this dowel to serve as an anchor for the main-sheet line.

Now for the sail! First of all in the sail construction is the mast. This consists of a round stick, 5 ft. long by $1\frac{1}{8}$ in. thick. Ten inches of this, at one end, is incased in a piece of brass tubing, and this

end is dropped into the 10-in. length of 2-in. pipe that projects, upright, from the front end.

For the single lateen sail, which is the rig used on this type of craft, take one 8 ft. 6 in piece of 2-in. half-round molding and one 9-ft. length and hinge them together with a small strap hinge, as shown in Figs. 8

Left, Screwing the Two-Inch Floor Flange to the Underside of the Cross-piece That Carries the Skates; Right, Screwing the Ten-Inch Length of Two-Inch Pipe into the Floor Flange



Left, Assembling the Backbone and Spacer, Which Is a Six-Inch Piece of Two-by-Four, on Top of the Cross-piece and Pipe; the Three Members Are Then Securely Spiked Together

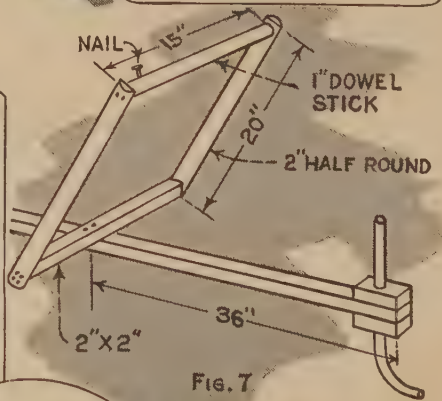


FIG. 7

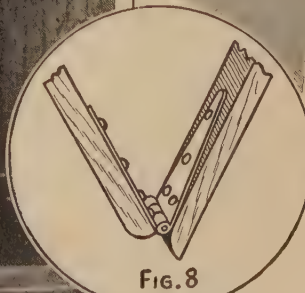


FIG. 8

Above, the Construction of the Handle; Note the Nail in It to Serve as a Cleat for the Main Sheet; Left, How the Spars for the Lateen Sail Are Hinged Together; Note, in Fig. 9, the Two-by-Four-Inch Spacer over the Pipe on the Crosspiece

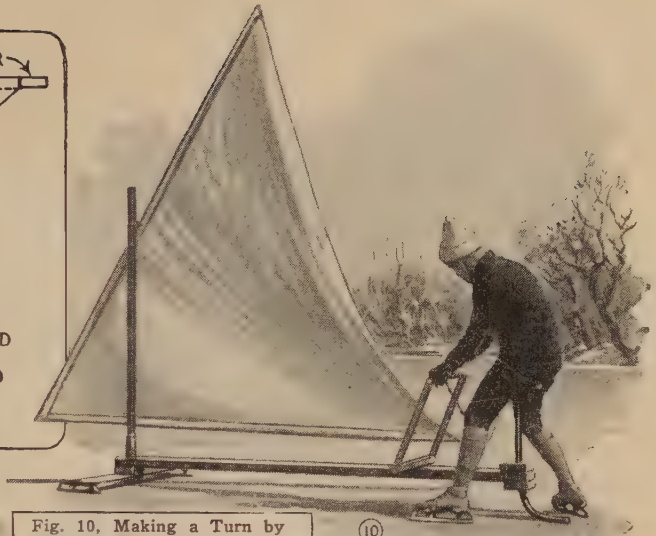
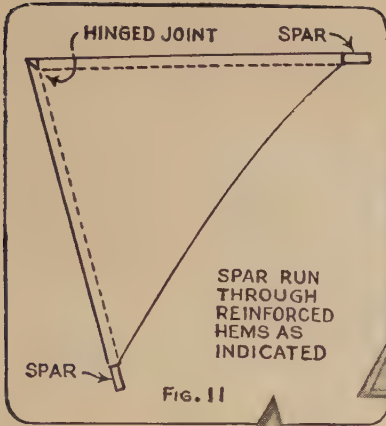
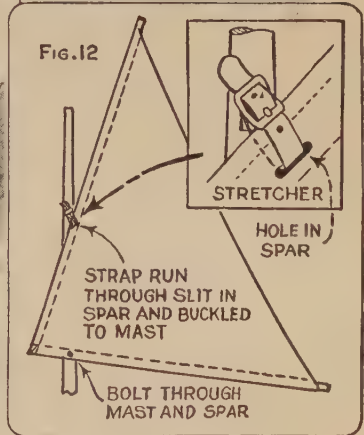


Fig. 10. Making a Turn by Swinging the Rudder with the Body While Digging In with the Left-Hand Skate; Fig. 13, Ready for the Start



and 9. Lay the hinged sections on the ground, and spread the two pieces until a distance of 9 ft. 6 in. separates the two ends. That's the size of your sail. Procure a good grade light canvas, zephyr cloth or sailcloth, and cover the area indicated. The usual lashed rigging is dispensed with, and, in its stead, two large seams are used, the spars of half-round running through these, as shown in Fig. 11. Bore a small hole through the shorter spar and from this run a light rope 18 ft. long. This is your main sheet. Half of the rope should be doubled back on its own standing part and knotted every foot or so, making a series of nooses which can be looped over the large nail in the sled's handle.

In mounting the sail in place, a long bolt running through the mast fits into a

corresponding hole cut in the lower spar, while a stretcher, made from an old piece of strap, takes the upper spar, as shown in Fig. 12.

An old bicycle seat with the post attached is slipped into place over the rudder stem for a seat.

Almost finished! It remains yet to give the sail a coating of light shellac or varnish in order to make an air-tight rigging. And there you are!

Navigating this midget ice sled is a thing which calls for considerable "seamanship." It is extremely narrow of beam, it carries a big spread of canvas in comparison to its light weight, and it offers but very little resistance on a wind-swept sheen of clean ice.

To begin, take your place astraddle the

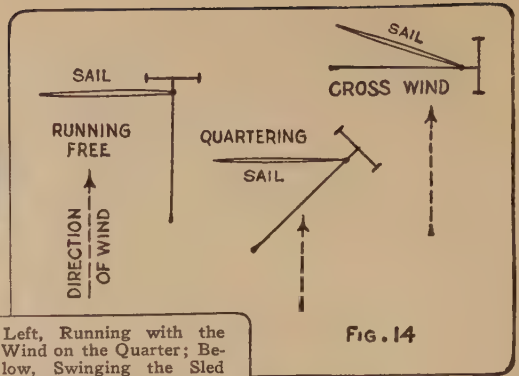


FIG. 14

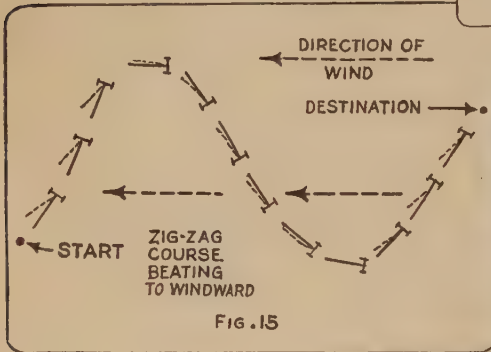


FIG. 15



rudder stem, as shown in Fig. 13. On your feet are a pair of ice skates, the blades of which have been ground to a single sharp edge. These are your "lee-boards." By digging them firmly into the ice you can prevent any tendency toward side drifting when beating out a tack to windward.

In regard to the sailing itself, the simplest and most natural maneuver is sailing to leeward, that is, sailing in the direction the wind is blowing; see Fig. 14. The fullest measure of sailing to leeward comes in sailing with the wind directly behind you. When you are "running free" in this manner, watch out for "jibbing." This is caused by sudden puffs of wind which swing the sail from one side of the sled to the other, invariably catching you off balance, and a spill is the result.

Sailing against the wind is nautically defined as "beating to windward," and it is here that real sailing skill is necessary.

It is quite evident that you cannot sail directly into the wind, but you can sail at an angle to the breeze and still be going forward. What you do, then, is to make your way forward by a series of zig-zag runs, known as "tacks."

After beating along one tack on your zigzag course into the wind, you come to a place where you wish to turn about and start off in the opposite direction. To do so, you lift up on the handle of the sled, allowing it to swing around on the pivoted rudder, as shown to the right of Fig. 15. The boom will then swing on the pivoted mast to the other side of the sled, the sail fills again, and you are off on another tack. Fig. 15 should make this clear.

Needless to say, you will have spills galore in manipulating this ice sled. A puff of wind catches you off balance and the boat goes off in one direction and you slide off in another. But keep at it! You

get a real kick in learning, from experience, just what angle to keep the sail in order to remain in the vertical and at the same time make good headway.

Roofing Used as Floor Covering

One of the best and most durable floor coverings for the home workshop, back porch, basement, and similar places, is the prepared roofing commonly used on barns and other buildings. (Its serviceability for this purpose is shown by one instance where it survived several years' hard usage without being worn through.) Roofing which has no crushed stone imbedded in it, and is not tarry, is used for the purpose. Before laying it down, the material should be unrolled in the sun and allowed to expand, after which it is cut to length and tacked in place. The cost is about one-fourth that of linoleum, and the roofing, which is usually guaranteed for about fifteen years of service on the roof, seems to last about five years as a floor covering.—Harold E. Benson, Denver, Colo.

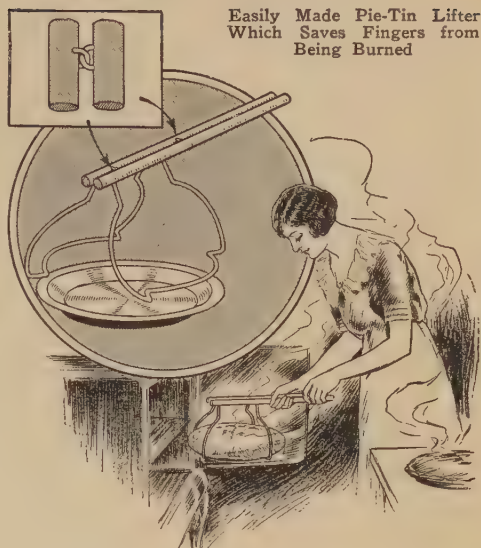
Kink for Preventing Plier Marks

Although the ordinary plier is one of the most useful household tools, it has the disadvantage of leaving marks on the work, particularly when gripping thin sheets of metal. This can be prevented and a greater contact surface provided by inserting a clothespin between the jaws of the pliers, if the split in the clothespin is large enough to take the work.—Frank W. Bentley, Jr., Missouri Valley, Iowa.



Clothespin Held in Jaws of Pliers Grips Work without Marring It

Holder for Hot Pie Tins



Easily Made Pie-Tin Lifter Which Saves Fingers from Being Burned

How many times have you burned your fingers when taking hot pie tins out of the oven? Here is a holder that will prevent it, and anyone can make it in a few moments. It consists of two 12-in. lengths of wood, about $\frac{1}{2}$ in. in diameter, hinged together by means of staples as shown. Two lengths of No. 12 galvanized-iron wire are bent to fit under the edge of the tins and attached to the handles by drilling holes through the wood and, after the ends of the wire are pushed through, bending them over to prevent them from slipping out. By turning the handles the tins can be gripped or let loose quickly.—Miss Floy Bates, Hardin, Mo.

Cleaning Furnace Smoke Pipe

I used a poor grade of coal in my furnace last winter, which made a thorough cleaning of the smoke chamber necessary. As an experiment I tried a novel method. An ordinary paper bag was inflated and a light string tied around the neck. The bag was placed in the clean-out pipe so that the draft would push it through, and then it was pulled back again. After doing this a few times, the soot was removed.—F. A. Inman, Grand Haven, Mich.

¶ An artistic garden gate can be made by swinging an end section of an iron bed on eyebolts.



Two Homemade Games of Skill Which Afford Endless Amusement for Young and Old; Both Are Easy to Make

Two Homemade Ball Games

Two games, which will afford endless amusement to adults as well as to the younger folks, are shown in the drawing. One is similar to the well-known game played with marbles. A length of 1-in. board, nailed to two end supports so that it can be set on edge, a pair of cues made from old broomsticks and a couple of balls about the size of baseballs are all the equipment required. A number of notches, just a trifle larger than the balls to be used, are cut in the board. This makes it necessary to shoot the ball through the holes squarely, which requires skill. The game is begun by shooting the ball, from a starting point, toward one of the holes. If the hole is missed, the next player takes his turn. If desired, the size of the notches may be graduated so that the smallest hole counts for the greatest number of points. The lower illustration is a game, also novel, in which the player lashes a

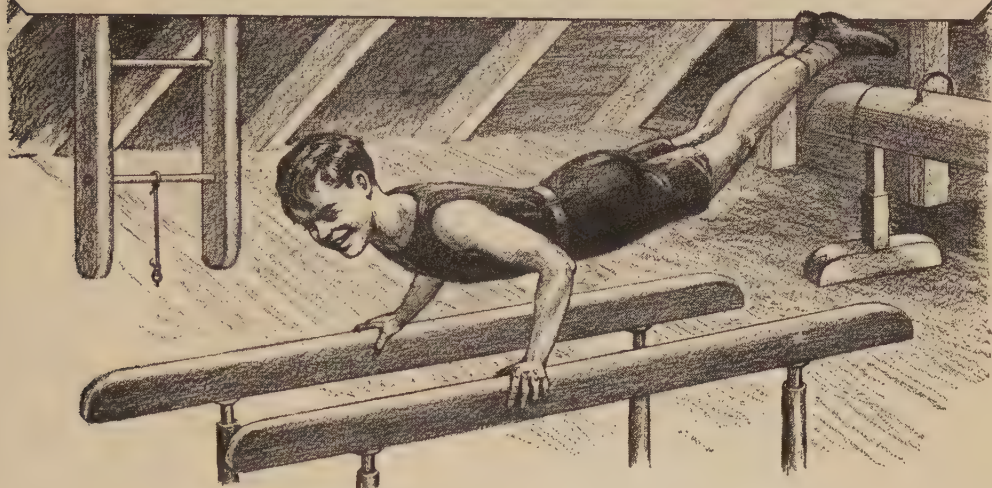
baseball from a pedestal with a whip. Considerable skill and a sure eye are necessary to strike the ball, but one man has become so expert that he can curl the lash around the ball and, with a quick jerk, pull the ball forward and catch it. In this game each player is given a number of chances to dislocate the ball. The whip used consists of a strong wooden stick to which a length of rawhide is tied.—James E. Noble, Toronto, Can.

Curtain and Shelf Form Neat Wardrobe Space

When building a shelf in a bedroom, which was not provided with a clothes closet, it was desired to hang the clothes under the shelf and this made it necessary to hang a curtain to cover the wardrobe, keeping the clothes out of sight and protecting them from dust. Instead of the usual method of attaching the curtain so that it could be slid back on a cord, I had a wide hem sewed at the top edge so that two $\frac{1}{2}$ by $\frac{7}{8}$ -in. sticks, 18 in. long, could be inserted. These sticks were pivoted with wood screws to the underside of the shelf so that they could be swung out as shown. Metal clips were provided to support the ends of the sticks at the center of the shelf when the curtain was closed. On the sides and front, the curtain was tacked to the edge of the shelf and to the pivoted sticks.—A. J. Call, Hartsville, Mass.



YOUR HOME GYMNASIUM



WITH a little outlay of time and money an attic or basement can easily be fitted up with homemade apparatus as a gymnasium, where the "daily dozen" can be taken with more zest and interest than is usual with the light movements of calisthenics. Lacking sufficient headroom, rings and the flying trapeze are pretty much out of the question, but a well-selected group of other devices is possible.

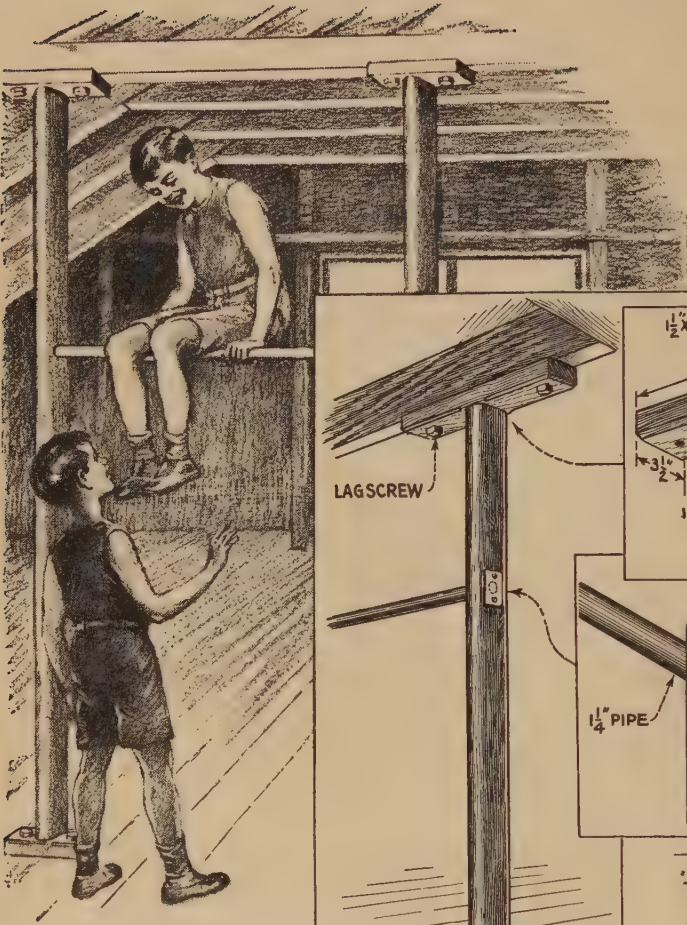
A trapeze bar is useful, even when the ceiling height is not sufficient to allow of much work above it. Obtain two pieces of 2 by 4-in. pine, or other wood not likely to splinter, mill-dressed on all sides, and cut them $\frac{1}{4}$ in. shorter than the distance from ceiling plaster or joists to the floor. Round off both edges to semicircular profiles by gauging lines on the faces $\frac{3}{4}$ in. from the edges, jointing off the corners to octagon shape, and ending by removing the new corners formed, until the pieces can be finished with scraper and sandpaper. Centering on each end, work a tenon, $1\frac{1}{2}$ in. square and $1\frac{3}{8}$ in. long, by notching in from the edges 1 in. These form the uprights for carrying the bar.

For secure fastening to floor and ceiling, cut a piece of 2 by 4, 8 in. long, and one 1 ft. 6 in., working mortises in each, $1\frac{1}{2}$ in. square, through the thickness of the stock

and centering on the faces, by boring a $1\frac{1}{2}$ -in. hole and chiseling out the corners. Bore $\frac{1}{4}$ -in. holes for lag screws 1 in. from each end, and chamfer the edges of the faces back to the point of joining with the uprights.

To erect the uprights, note the direction of the ceiling joists, so that the ceiling cleats may be turned lengthwise or crosswise of the joists as the case may require, and slip the cleats on the tenons. Place the ceiling cleat of an upright so that the screws will enter the joists, and slide the lower end with its cleat to its place. Plumb in both directions, using a straightedge with the level in case the upright is sprung, and drill $\frac{1}{8}$ -in. holes in floor and ceiling to receive the lag screws. Use a washer under the head of each screw, and turn down as tightly as possible. Preferably, the uprights should be 5 to 6 ft. apart, but this distance, of course, will be determined by the space at hand.

A length of $1\frac{1}{4}$ -in. pipe forms the bar. Determine the height of one end and level across the other upright, and bore holes large enough to allow the bar to be forced through. When it is in place, screw over each end a plate, about $\frac{1}{8}$ in. thick, 2 in. wide and $2\frac{1}{2}$ in. long, drilled and countersunk for No. 10 screws. To prevent turn-

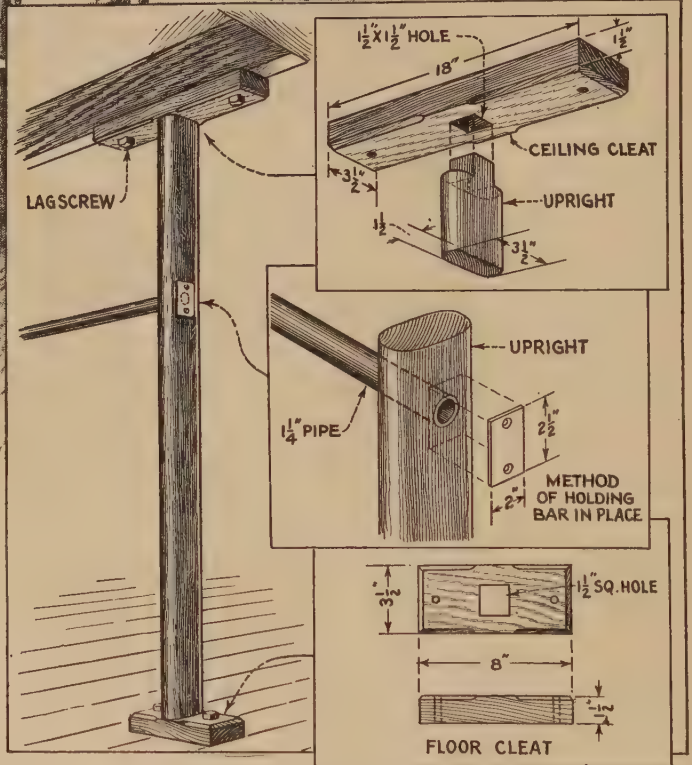


ing, drill a $\frac{1}{4}$ -in. hole through each upright from edge to edge, passing through the bar, to receive a cotter pin made of a 16-penny common nail. Two coats of boiled linseed oil are a sufficient finish for the wood, although a coat of shellac followed by two of varnish lessen the chance of splintering.

The parallel bars are so simple of construction as to hardly require a description. The bars are 5 ft. long, of 2 by 3-in. stock, surfaced four sides, with upper edges and ends rounded as described for the trapeze uprights.

The post sockets are made by screwing into one end of a tee-fitting a 1-in. pipe, cut 2 ft. 3 in. long and threaded at one end, and into the other end a $3\frac{1}{2}$ -in. length of pipe. A piece of 3 by 4-in. pine, 16 in.

long and rounded at the corners, is bored through from edge to edge, centering, to fit over the short pipe of each socket. Unite the sockets of each bar with a 1-in. pipe stretcher, 3 ft. 2 in. long, threaded at both



ends and screwed into the tee branches. Turn the bases at right angle to the stretcher, and $\frac{1}{2}$ in. above the lower edge of each, drill a $\frac{1}{4}$ -in. cotter hole passing through the short pipe.

The posts are of $\frac{1}{2}$ -in. pipe, cut 2 ft. 9 $\frac{3}{4}$ in. long. Starting 4 in. below the upper ends, drill $\frac{1}{4}$ -in. holes through the posts every 2 in. to within about 8 in. of the lower ends. Locate the holes in the bars for the sockets by comparison with the assembled stands. Sixteen-penny nails serve as pins to adjust the height of the bars. Put the posts in the bars, slip a washer over each, and mark for a $\frac{1}{4}$ -in. cotter hole.

For the body of the buck or "horse," make from 2 by 8-in. stock four bulkheads, 10 in. long, as shown in the detail. The semicircular edges, 5 in. in radius, are most easily cut by repeatedly sawing off corners, and finishing with a chisel and spokeshave. Two of these, forming the ends of the main body, are drilled 1 in. and 5 in. above the lower edges for $\frac{1}{4}$ -in. bolts, and counterbored on the face to sink the bolt heads flush. The other two are notched $\frac{3}{4}$ in. wide and $2\frac{1}{2}$ in. deep, $3\frac{3}{8}$ in. from each end. Just above these notches, on one side of each, nail a $\frac{3}{4}$ by $1\frac{1}{2}$ -in. strip, and 1 in. above it bore two pairs of $\frac{1}{4}$ -in. holes, as shown, to receive the legs of the U-bolts that secure the handles.

Each post is of 3 by 3-in. stock, sized to $2\frac{1}{2}$ in. square, and cut 2 ft. 11 in. long. Five inches below the upper end cut notches $2\frac{1}{2}$ in. wide on opposite sides and $\frac{3}{8}$ in. deep. Centering on these sides, bore $\frac{1}{2}$ -in. holes every 2 in. below the notches to within 8 in. of the lower end. Centering on the other sides, bore two $\frac{1}{4}$ -in. holes, one $2\frac{1}{2}$ in. from the upper end and the other $3\frac{3}{4}$ in. below it.

Bolt the posts to the end bulkheads with $\frac{1}{4}$ -in. machine bolts, $\frac{1}{4}$ in. long. Cut two pieces of 1 by 3 in., sized to $\frac{3}{4}$ by $2\frac{1}{2}$ in., 2 ft. 9 in. long,

and unite the two posts by gluing the ends of the strips into the post notches and holding them with two No. 10 wood flat-head screws. Slip the other bulkheads

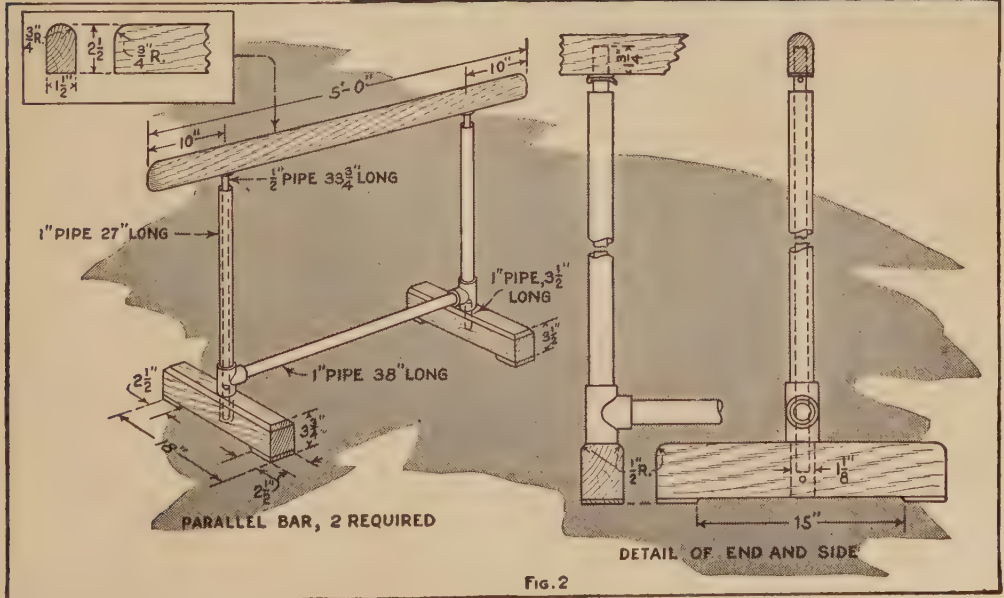
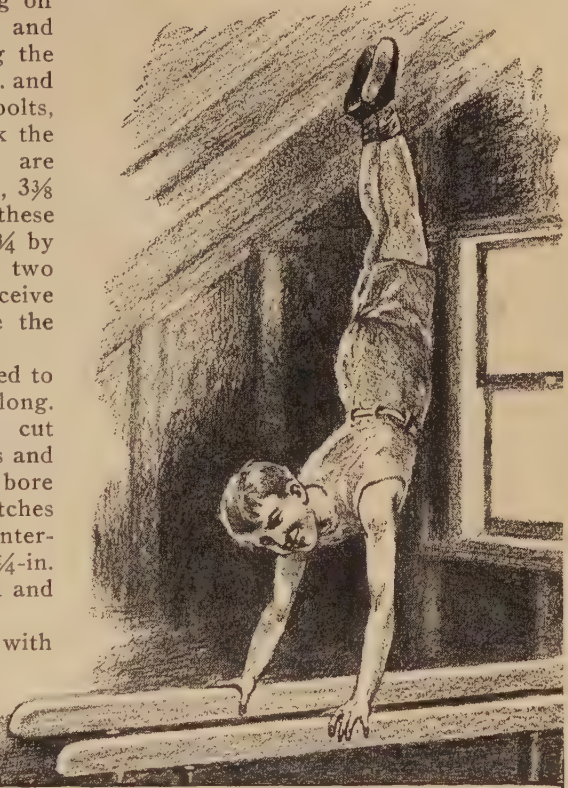
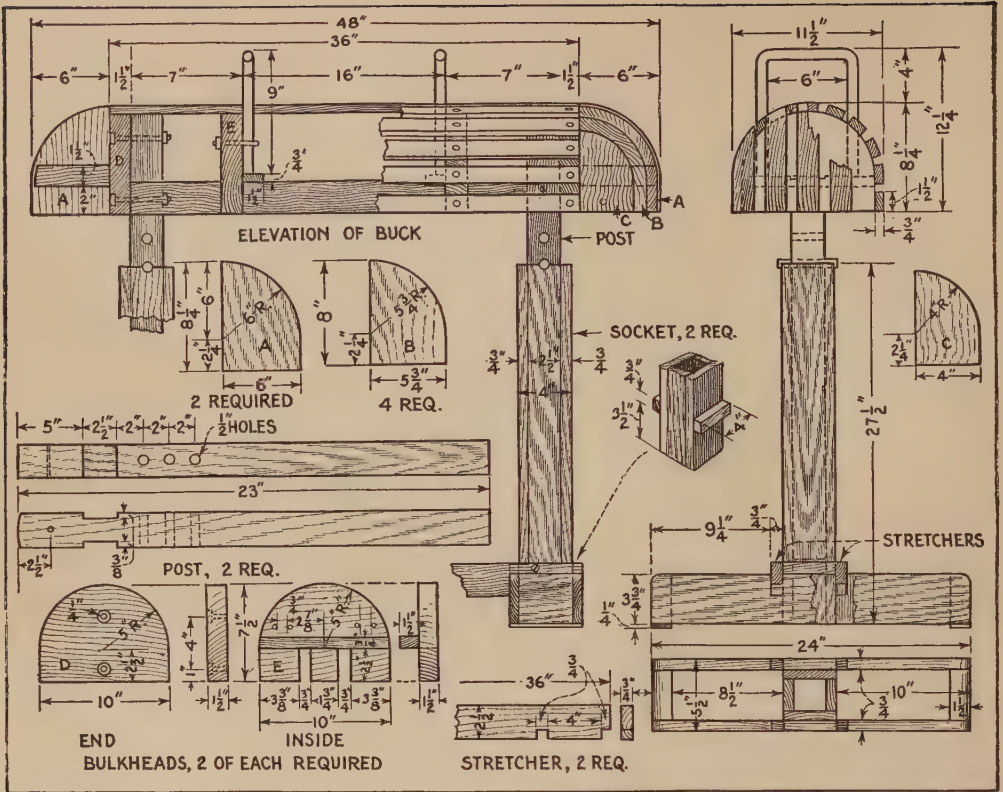


Fig. 2



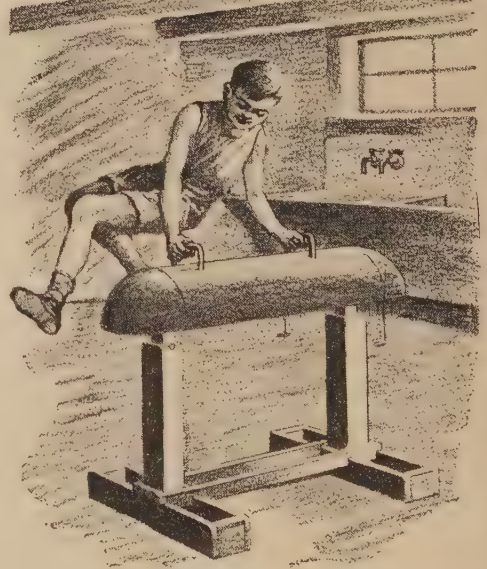
over the strips, cleats toward the center, with 7 in. between end bulkhead and the inner. Nail the cleats to the strips.

Make two handles by bending pieces of $\frac{1}{2}$ -in. round iron, 2 ft. long, into "U"s as illustrated, with 6 in. between the legs. Bolt these to the inner bulkheads with $\frac{1}{4}$ -in. U-bolts, resting the legs on cleats.

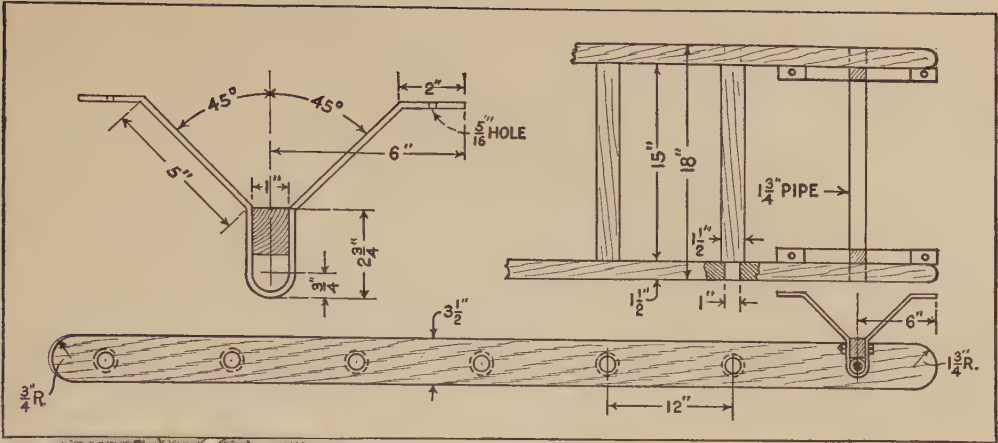
Now cut eleven 3-ft. strips of $\frac{3}{4}$ by 2-in. pine and tack to the bulkheads as shown, with equal spaces between. Bore and countersink for No. 10 flat-head wood screws at each bulkhead.

The rounding ends are made by cutting the three sizes of 2-in. stock illustrated. Make the large sizes and nail to the centers of the end bulkheads, and nail on each side a spacing strip 1 in. thick. Nail in place the four next smaller segments, nail on other spacing strips, and lastly nail up the sidepieces. Chisel off the corners to the desired roundness.

The sockets are square tubes made by gluing and nailing a pair of strips, $\frac{3}{4}$ by $2\frac{1}{2}$ in. by 2 ft. $3\frac{1}{2}$ in., between two pieces of the same thickness and length, 4 in. wide.



Glue and screw across each wide board side a $\frac{3}{4}$ by $\frac{3}{4}$ -in. cleat $3\frac{1}{2}$ in. from the lower end. For the feet, cut four 2-ft. lengths of 1 by 4-in. stock, finished to $\frac{3}{4}$



by $3\frac{1}{2}$ in. Glue and secure with two screws, butting the upper edges against the cleats as shown; or if it is desired to make them removable, use four screws without glue. Give an equal projection at each end, and be sure they line with each other and are square with the sockets. Cut a 2 by 4-in. block between each end, nailing solidly, and put across the bottom a $\frac{1}{4}$ -in. strip, $1\frac{1}{2}$ in. wide, to prevent rocking of the buck in case of twisting of the material. Flush with the socket sides, cut $\frac{3}{4}$ -in. notches, $\frac{3}{4}$ in. deep, to receive the stretchers.

The stretchers are of 1 by 3-in. stock, cut 3 ft. long, with the longer corners notched $\frac{3}{4}$ -in. square, and similar notches cut 4 in. behind them. Slip these into the foot notches and put two screws in each end into the sockets. Put the posts into the sockets, and hold them at any desired height between 3 ft. and 5 ft. with hardwood pins passed through holes in the posts. Make a semicircular hole in the top of each socket to bed the pins.

Pad the body with rags and cover with burlap, folding the edges neatly underneath and nailing with upholsterers' tacks.

The ladder, shown in the last illustration, is an excellent exerciser. Like the uprights of the trapeze, the ladder slides are rounded on both edges, but their length is 2 in. less than the height of the room, and the ends, instead of being tenoned, are rounded off. Starting 6 in. from one end, bore 1-in. holes every 12 in., centering on the sticks, until the last round, which is also placed 6 in. from the end. The upper round is a piece of $\frac{3}{4}$ -in. pipe.

Make the necessary number of rounds $1\frac{1}{2}$ ft. long from $1\frac{1}{2}$ -in. full round. Taper the ends and assemble with the sides as these lie on a pair of sawhorses. With the frame squared, set a pair of dividers to $1\frac{1}{2}$ in., less the distance the round ends are entered, and scribe the tenon shoulders. Remove the rounds, saw in carefully $\frac{1}{4}$ in., and pare the tenons true.

Reassemble the rounds and the sides, applying glue to both mortises and tenons, and clamp solidly together. Wipe off excess glue while it is soft. When the glue has set, smooth the wood very carefully, since the ladder is used for heavy hand work, and splinters or rough places will mean injury.

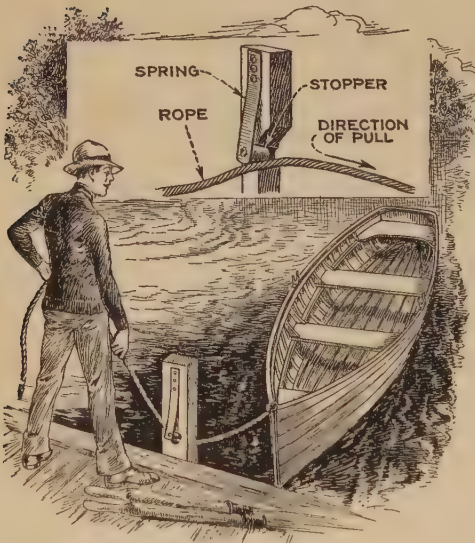
The two hangers are bent from $\frac{1}{4}$ by 1-in. strap iron, cut 21 in. long and bent at the middle with a 1-in. pipe as a mandrel. Bend back the sides $2\frac{3}{4}$ in. above the bottom of the curve to angles of 45° , and bend the ends back 2 in. until they line with each other. Drill $\frac{5}{16}$ -in. holes in the ends to receive $\frac{1}{4}$ -in. lag screws, and drill simi-

lar holes through the loops, where bolts, passing through wooden blocks, can clamp the pipe round at the upper end of the ladder to prevent bounding when in use.

Screw the hangers to 2 by 4-in. cleats, similar to the ceiling cleats for the trapeze uprights, and screw the latter to the ceiling joists. To support the other end, when the ladder is up from the floor, put up a ceiling cleat with a stout screweye, and loop a rope under the round. A like device near the floor on the wall or a screweye in the floor holds the ladder vertical.

For use in conjunction with the ladder in abdominal exercises, build a stout little bench for a seat.

Quick Hitch for a Rowboat



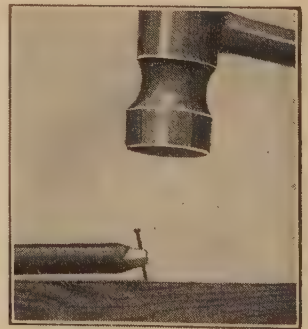
This Simple Fastening Device Permits Anyone to Dock a Rowboat Securely

Many persons who like to row are not familiar with the proper method of fastening a rowboat to the dock. Some knots will slip and others may come untied. By providing the simple arrangement shown in the drawing, anyone can quickly fasten the boat so that it will not come loose and drift away. A short plank is spiked vertically to the edge of the dock, and a hole, somewhat larger than the tie rope or painter, is drilled through it about 4 in. above the floor. The hole should be tapered with a sharp knife so that the opening facing the water is at least $\frac{1}{4}$ in. less

in diameter than the opposite one. A hardwood stopper, about half as large across as the hole, is made and fastened securely with a wood screw to a strip of spring steel, which is bolted or screwed to the plank above the hole so that it forces the stopper into the hole. The spring should rest flat against the plank. When the boat is docked it is only necessary to push the rope through the hole for a short distance. The pressure of the spring forces the stopper against the rope, and any pull by the boat will jam the stopper even tighter.

Holding Small Nails Securely

It is often difficult to hold and start small brads and nails. Here is a method which enables you to hold the brads securely. Cut a fairly deep slit in the rubber eraser on the end of a lead pencil and slip the brad into the slit. Hold the pencil so that the brad is set in the proper position and drive it down with the hammer. —Frank W. Bentley, Jr., Missouri Valley, Iowa.



□ Piston-ring edges should be left sharp, and only a slight burr removed.

YOUR HOME GYMNASIUM



THE ROWING machine to be described is equipped with a sliding seat which allows a 5-ft. stroke and is an excellent exerciser, simple in design, yet substantial, and well suited to its purpose.

Fig. 1 is a detail of the sills. Cut a piece of sized 2 by 4-in. stock 5 ft. $4\frac{1}{2}$ in. long, and choose a good edge and good side as faces. On one end lay out for a tenon, $\frac{1}{2}$ in. thick, centering on the edges, and 2 in. long. Gauge it for a width of $2\frac{3}{4}$ in., giving a shoulder, $\frac{3}{4}$ in. wide, on the lower edge. On the other end lay out for a tenon, $1\frac{1}{2}$ in. wide, centering on the width of the piece, and having full thickness of the stock.

Gauge for a mortise, $\frac{1}{2}$ by $2\frac{1}{2}$ in., centering on the upper edge, 6 in. from the thin tenon shoulders, and center on the inside face a mortise, $1\frac{1}{2}$ in. square, 2 ft. 9 in. from the shoulders of the thick tenon. A triangular notch, $3\frac{3}{4}$ in. long and sloping $\frac{1}{2}$ in., is cut in the upper edge, with the deep end 6 in. from the square mortise. Cut the notches forming the thick tenon, rip the sides of the thin mortise, crosscut the shoulders and rip to width. Chisel out the narrow mortise in the edge to a depth of 2 in. Bore the center of the

square mortise 1 in. deep, and trim the corners with a chisel. The other sill forms a pair with the first.

The sills are tied together by three cross rails. Fig. 2 shows the forward track rail, the tenons of which enter the square mortises near the middle of the sills. It is of 2 by 4-in. surfaced stock, cut $24\frac{1}{2}$ in. long, with $1\frac{1}{2}$ -in. wide tenons centering on the width of each end, made by cutting 1 by $1\frac{1}{2}$ -in. notches out of top and bottom edges. To carry the ends of the track, make a notch, $\frac{3}{4}$ in. wide and 1 in. deep, in the upper edge, $\frac{4}{8}$ in. back from the tenon shoulders. The rear track rail, illustrated in Fig. 3, has a notch centering on each end, $1\frac{1}{2}$ in. wide, which fits over the sill-end tenon. Cut track notches as in the forward rail.

The lower weight rail, Fig. 4, being subject to blows from the weight, is of 3 by 4-in. stock, cut 1 ft. $11\frac{1}{2}$ in. long, with a 1-in. thick tenon, $\frac{1}{2}$ in. long, centering on the thickness of each end. These are $2\frac{3}{4}$ in. wide, flush with the upper edge and $\frac{3}{4}$ in. above the lower edge.

Each track is of 1 by 4-in. stock, sized to $\frac{3}{4}$ by $3\frac{1}{2}$ in. and cut 3 ft. long. The upper edge is tapered evenly from both

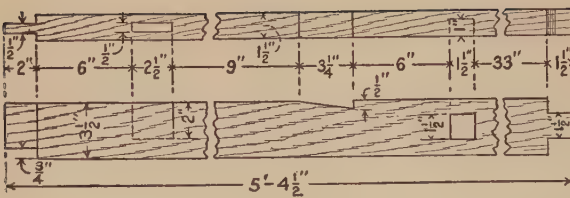


FIG. 1: SILL, 2 REQUIRED

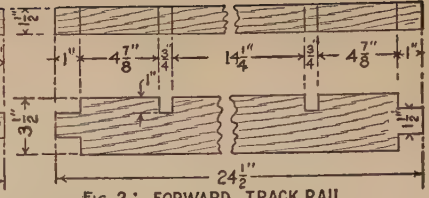


FIG. 2: FORWARD TRACK RAIL

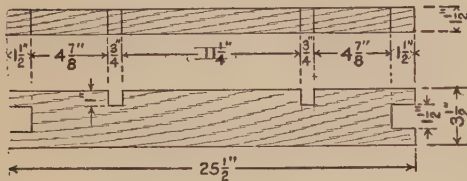
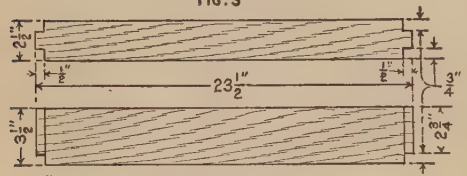
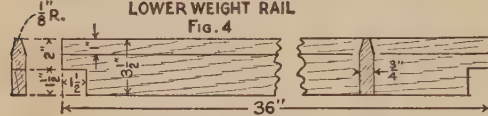
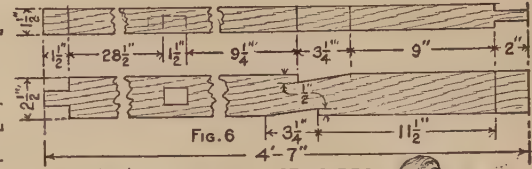
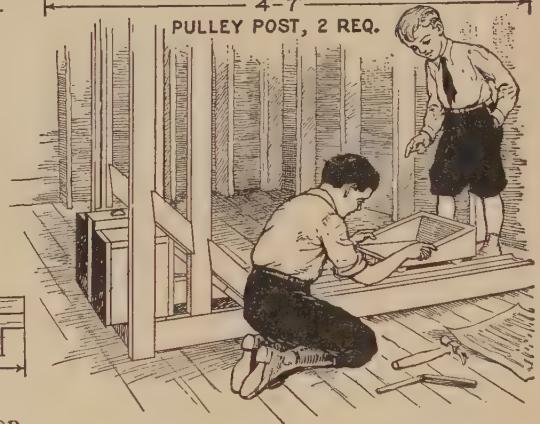
REAR TRACK RAIL
FIG. 3LOWER WEIGHT RAIL
FIG. 4

FIG. 5 TRACK DETAIL



PULLEY POST, 2 REQ.



sides, beginning 1 in. down, until the top is $\frac{1}{4}$ in. thick, and this is rounded off, as in Fig. 5. Notch the lower edge of each end $1\frac{1}{2}$ by $1\frac{1}{2}$ in., to fit into the rail notches, so that the track projects above the sills and rails 1 in.

The pulley posts, detailed in Fig. 6, are of 2 by 3-in. stock, sized to $1\frac{1}{2}$ by $2\frac{1}{2}$ in. Cut a piece 4 ft. 7 in. long, and lay out for a tenon on the lower end, $\frac{1}{2}$ in. thick and 2 in. long, centering on the thickness, full width of the stock, and on the upper end, for a tenon, 1 in. wide and $1\frac{1}{2}$ in. long, centering on the width. On the inner face, 2 ft. $4\frac{1}{2}$ in. below the shoulder of the upper tenon, center a mortise, 1 in. wide by $1\frac{1}{2}$ in. long, to be cut 1 in. deep. A brace notch, $3\frac{3}{4}$ in. long, sloping from nothing at the bottom to $\frac{1}{2}$ in. deep at the top, is located 9 $\frac{1}{4}$ in. below the mortise, on the rear edge, while a like notch is cut in the other edge $2\frac{1}{2}$ in. above it, or $11\frac{1}{2}$ in. from the shoulder of the lower tenon.

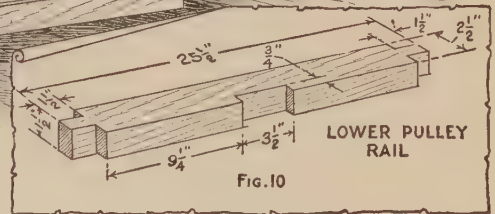
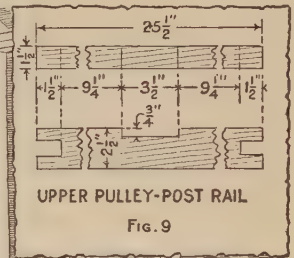
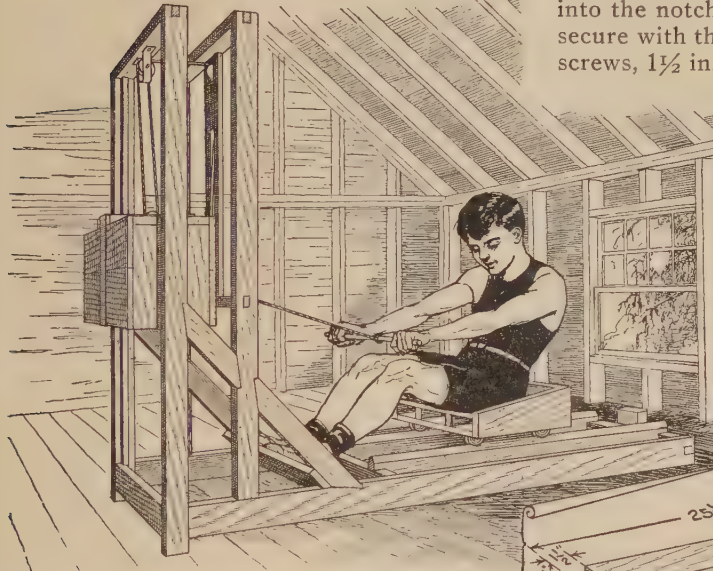
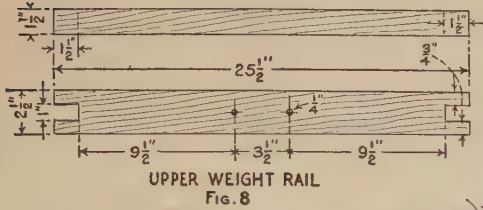
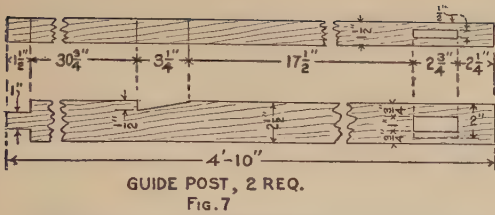
Each guide post is of 2 by 3-in. stock, cut 4 ft. 10 in. long, with the upper end worked in a tenon, 1 in. wide and $1\frac{1}{2}$ in. long, centering on the side. A mortise, $\frac{1}{2}$

by $2\frac{3}{4}$ in., to receive the end tenon of a sill, is centered on the rear edge and hollowed out 2 in. deep, while, on the inner face, another, 1 by $2\frac{3}{4}$ in., to receive the weight-rail tenon, is made. The brace notch is like those on the pulley posts, the deep upper end being 2 ft. $6\frac{3}{4}$ in. below the upper tenon shoulders. (See Fig. 7.)

Make the upper weight rail, and the upper and lower pulley-post rails, of 2 by 3-in. stock. The upper weight rail, as in Fig. 8, is notched on each end, centering on the faces, 1 in. wide and $1\frac{1}{2}$ in. deep, for fitting over the tenons of the guide posts. Centering on the stock, width and length, bore two $\frac{1}{4}$ -in. holes $3\frac{1}{2}$ in. apart, for bolts to secure the pulley hanger.

Make the upper pulley-post rail, shown in Fig. 9, the same, except that the holes are omitted, and in one edge a notch, $\frac{3}{4}$ in. deep and $3\frac{1}{2}$ in. long, centering on the length, is cut. The lower rail is like it, except that instead of notches in the ends, tenons 1 in. wide, are made. (See Fig. 10.)

Assemble the sills and posts with the rails dry, to see that the joints are good



and that no long tenons or shallow mortises prevent their closing up. Satisfied on this point, apply glue to both mortises and tenons, and clamp together. Square carefully, and drive two or three six-penny finish nails through the edge of the stock into the tenons, while under pressure from the clamps. Drive two sixteen-penny casing nails into each end of the lower weight rail. Wipe off surplus glue.

Cut two pieces of 2 by 3-in. stock, 6 in. long, squaring the ends carefully, and clamp them between the upper rails of the posts, keeping them back from the ends 2 in., and toenailing the ends into the rails with eight-penny finish nails. Note that these are not shown on the perspective below Fig. 8.

Make the braces of 2 by 3-in. stock,

scribing each piece individually by holding it behind the posts and sills in position, and marking with a sharp pencil. Cut carefully to make a snug fit. Slip into place and nail solidly with three sixteen-penny casing nails in each end, driven into holes drilled just large enough to give solid nailing without splitting.

Using 1 by 4-in. stock, sized to $\frac{3}{4}$ by $3\frac{1}{2}$ in., make the pulley stile shown in Fig. 11. It is 2 ft. $7\frac{1}{2}$ in. long, with a $\frac{5}{8}$ by $2\frac{1}{2}$ -in. through mortise worked $2\frac{1}{4}$ in. from each end, centering on the stock. Bore these out with a $\frac{5}{8}$ -in. bit, and trim the sides with a chisel. Slip the ends into the notches of the pulley rails and secure with three No. 10 flat-head wood screws, $1\frac{1}{2}$ in. long, in each end.

Bend up a pulley hanger as detailed in Fig. 12, using $\frac{1}{4}$ by $1\frac{1}{4}$ -in. iron cut 11 in. long. Bend to a "U" over a $\frac{5}{8}$ -in. mandrel, and bend back the ends to a line $3\frac{1}{4}$ in. from the lower end. Drill the ends with $\frac{5}{16}$ -in. holes, $3\frac{1}{2}$ in. apart, to receive $\frac{1}{4}$ -in. bolts, and $1\frac{1}{2}$ in. from the bottom, centering on the stock, drill a $\frac{1}{4}$ -in. hole through both sides, to carry a spike for securing the pulley. Bolt the hanger under the upper weight rail with bolts $2\frac{1}{2}$ in. long.

The weight box (Fig. 14) is 10 by 18 by 12 in., inside measurements, giving a sand capacity of over 100 lb., or a possible re-

in. long, and notch the ends so that it can be slipped between the sills and under the braces as a footrest, where it is nailed solidly. Screw on top two loops of leather as toe clips, to enable the person using the machine to draw the seat forward after a backward stroke. Insert the pulleys in the frame mortises.

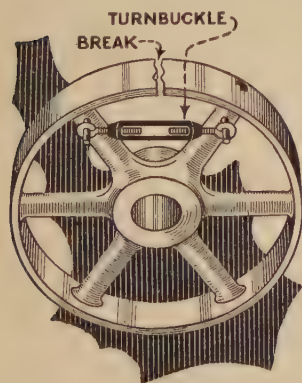
Pass the end of a piece of sash cord through the box pulley from front to back, and tie it to a heavy screweye driven into the upper weight rail as close as practical to the pulley hanger there. Pass the other end through the two upper pulleys, and through the lower pulley from the back. Block the weight box up from the rail 2 in., and tie a handle of broomstick or an 18-in. length of $1\frac{1}{2}$ -in. full-round stock to the cord just below the pulley.

To diminish shocks from the weight box, tack three or four short sections of tire casings to the upper sides of the lower rail.

Fill the box with sand until the weight desired is reached, put the seat on the track, and the machine is ready for use. The person exercising with it sits down, grasps the handle with both hands, and pulls backward as in rowing, at the same time straightening out both legs.

Quick Repair on Large Wheel

On a large bull wheel, which had cracked, the illustrated repair proved entirely satisfactory. A hole was drilled in each of two adjacent arms between which the rim was cracked, and pins were driven in to permit the attachment of a turn-



buckle. It is, of course, necessary that the pins be set at a slight angle, to prevent the turnbuckle from slipping off when it is tightened. Although this repair is not intended to be permanent, it will serve excellently in an emergency.—James McIntyre, Hartford, Conn.

Convenient Nut-and-Washer Carrier

In performing work on which a large assortment of nuts, washers, etc., are re-



Simple Carrier Which Holds a Large Assortment of Nuts and Washers

quired at widely separated points, the carrier shown herewith will be extremely useful. The base consists of a 10 by 12-in. section of heavy board, with a bolt crosswise through each end to reinforce it. Numerous $\frac{1}{2}$ -in. holes are drilled through the base and 10-in. lengths of $\frac{1}{2}$ -in. rod inserted in them. One end of each rod is threaded for some distance, so that two nuts, one on either side, will hold it to the base. A slightly longer rod, with a loop bent at the top, serves as a handle and is fastened to the center of the base in the same way.—Jos. C. Coyle, Denver, Colorado.

Coating Battery Terminals

A preparation consisting of three parts of paraffin and one part of sealing wax of the kind used in dry cells, makes an excellent coating for battery terminals, wires, etc. The two ingredients are melted together, and the mixture, applied while hot, will flow readily. Paraffin is too thin to be used alone for coating and the sealing wax dries too quickly, if used without the paraffin.—John E. Boxtow, Max, N. Dak.

Uses for Old Screen Wire

Old screen wire is usually thrown away, but it can be made serviceable for various purposes, as shown in the photo. Bunched



Screen Wire Can Be Used for Many Purposes After It Has Served for Doors or Windows

together and tacked to a stick, it makes a handy wire brush for cleaning stovepipes. It is not always safe to tap stovepipes with a stick to clean them, especially if they are old and nearly worn through. We had several bird houses for small birds, but the large birds bothered the tenants by perching on the roof ridges. To prevent them from doing this, we tacked a short strip of screen along the edge of the roof so that the sharp, ragged edge projected upward. This was found to be an effective cure. From another piece of old screen, we made a false bottom in a minnow pail to facilitate catching minnows. They are difficult to catch with the fingers, even in a small pail, but by raising the false bottom they cannot get away and you can readily get any one of them.—Frank W. Bentley, Jr., Missouri Valley, Iowa.

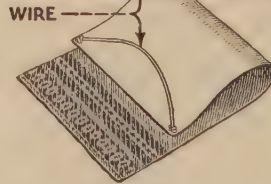
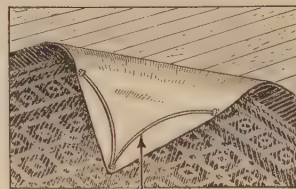
Inflation of Ford Balloon Tires

Underinflation of a balloon tire costs the owner just 700 miles of service per pound under the correct pressure, according to the results of a series of experiments conducted by the Ford company, in connection with a campaign to help owners of its cars to get the most out of their tires. To determine at just which point the Ford balloon tires yielded the maximum comfort consistent with maximum mileage, all makes of tires were tested. At the end of the test period, the exact loss per pound of underinflation was calculated in terms of mileage. A number of common tire ailments were

traced directly to underinflation. Among the most common are rim cuts, tread separation, overheating and stone bruising, in addition to a more rapid rate of natural wear and deterioration. On the other hand, every pound of overinflation takes its toll of comfort, and the fundamental value of balloon equipment is lost. Other advantages of low-pressure tires, namely, greater traction, ability to travel over soft ground without sinking, and quick stopping without skidding, are also nullified in a direct ratio to the excessive inflation. The following pressures have been found to be best for both riding comfort and long life of 29 by 4.40 balloon tires: The front tires on all types of Ford cars and the rear tires of the roadster, coupe and touring-car types should have 27 lb., while 30 lb. is right for the rear tires of a Tudor, Fordor and runabout with a pick-up body.

Keeping Rugs from Turning Up

Most rugs have a tendency to turn up at the corners or ends, which not only causes annoyance but will shorten their life. To prevent the trouble, get a length of spring-steel wire, about No. 14 gauge.



slipped in place as indicated. The larger rugs are treated in the same way, except that two lengths of wire are provided at each corner and arranged as shown.

☞ A little turpentine poured into the corners of wardrobes, trunks and drawers will keep moths away, but does not kill moths already present; therefore clothes should be given a good brushing and airing in the sunshine before they are laid aside.



This Realistic and Amusing Walking-Duck Toy Offers an Opportunity for the Home Craftsman to Display His Talents and Amuse the Youngsters at the Same Time

The Walking Duck

By H. C. McKAY

WALKING toys are always popular with children, and, in fact, many adults like to watch their antics. Toy builders are familiar with many mechanical devices for imparting the walking motion, such as joints, cranks, interrupted or eccentric wheels, but the least complicated and most effective is the form that operates through the forces of gravity and momentum. One of the simplest toys incorporating this principle is the walking duck, although, as will be seen, the same principle may be applied to any toy whose shape allows it to rest in equilibrium.

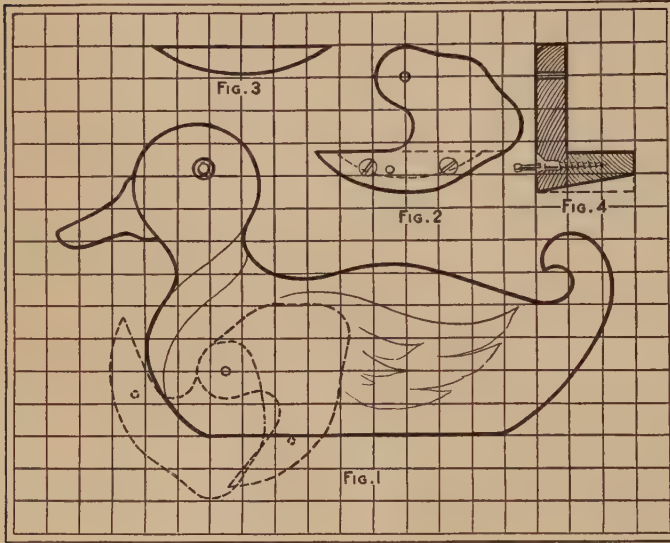
The toy is cut from $\frac{1}{2}$ -in. wood. Fig. 1 is the layout for the body. The feet are shown dotted in order that the proper relationship between them and the body may be seen, although, of course, the body is cut out without feet. It is drilled for the foot pivot as shown. This hole should

be at the exact point indicated for best results. The eyes and wings are next painted. In fact, the entire body should be fully enameled and the details added before assembly. When this is done, the feet are made.

Two feet are cut out of $\frac{1}{2}$ -in. wood as shown in Fig. 2, following the heavy line. These are placed together in a vise and carefully shaped so that they will be exactly alike, and exactly like the pattern, and the pivot hole is bored while both are clamped together. Take care to get this hole straight through and do not let it run at an angle.

The construction of the actual foot will be more easily understood by referring to Fig. 4. The cut-out piece (Fig. 2) has a piece of wood fastened to the bottom edge with small screws and glue. This piece is shaped to conform to the lower curve in

Fig. 2. When this assembly is complete, the foot will have the "leg" portion rising from one side, and will be supported upon a "rocker," $1\frac{1}{2}$ in. wide, since the squares in the diagram represent $\frac{1}{2}$ in. This rocker form should be true, so that there will be



a uniform forward motion to the walk.

The next step is the most important one in the construction, and the most difficult. Clamp the foot in a vise with the bottom of the rocker uppermost. With a fine file bevel the outside edge of the rocker, removing the portion shown by the dotted lines in Fig. 4. This removal is uniform on all surfaces of the bottom of the rocker, making its outer edge concentric with, but smaller than, the inside curve.

The dotted lines in Fig. 2 show the effect viewed from the side, while Fig. 3 shows the relative size and shape of the outer edge of the rocker. When this is complete and the assembly stood upright, the leg will no longer stand perpendicular but will lean toward the outside. The other leg is made to correspond, the bevel being in the opposite direction, of course.

The legs are now attached to the body of the duck with a pin of such size that they will swing freely. To prevent any binding, a washer should be placed between each leg and the body. The ends of the pin also receive washers and are then upset or flattened to prevent the legs from coming off.

The duck is now placed upon the table and pushed forward until the extreme front portion of the rockers lie upon the table surface. Mark the place where the legs strike the body. Into the inside of each leg drive a brad at this mark, leaving about $\frac{3}{8}$ in. projecting. This brad serves as a stop to prevent the foot from swinging too far back.

A cord is now attached to the front curve of the duck's breast. This completes the toy. If it is placed upon the floor and pulled by the string, the pull will throw the body to one side or the other. If it goes to the left, the surface of the left foot acts as a balance, and the duck moves forward upon the left rocker. Gravity swings the right foot forward, and the reaction throws the body to the right and it topples over, only to be stopped by the

surface of the right rocker coming into contact with the floor. It moves forward upon this while the left foot swings forward. This motion is continuous, the body of the duck swaying from side to side, the feet alternately advancing and retreating. The result is a very amusing simulation of the duck's waddle.

The decoration of this toy is left to the builder. A full-size blueprint of the toy is available for those who find it difficult to lay out by the square method. Send 25 cents to the Amateur Mechanics department of Popular Mechanics Magazine, Chicago, Ill.

Scissors Handy in the Kitchen

A pair of sharp scissors will cut meat for curries, pies, etc., in about one-half the time required to do it with a knife. They can also be used for cutting up oranges, dates, figs, grapefruit, etc., and are handy for trimming fins from fish. For stoning large cherries I have found nothing better and for cutting string beans scissors are hard to beat.—Mrs. James E. Noble, Toronto, Can.



“Outboard Motor” Pleases Youngsters

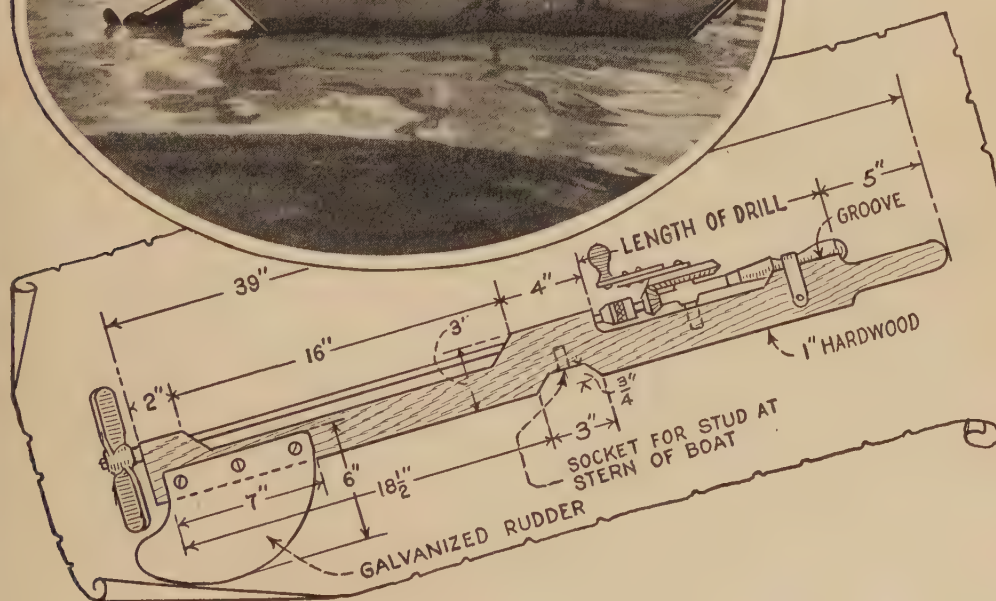
By HI SIBLEY

ROWING a boat has always seemed a clumsy and laborious means of getting over the water. Maneuvering in close quarters and on small ponds is awkward with oars. It's tough on unaccustomed backs in a pull against the wind, and your boat loses momentum between each stroke.

Turning a crank is much easier, as with this manual outboard motor. Perhaps one cannot go quite as fast with this device as with oars, but the push ahead is continuous, and a youngster with imagination will get a real thrill from seeing the water churning up behind; besides, he



FRONT END OF PROPELLER
SHAFT FILED FLAT ON 3
SIDES, THESE FLATS
THEN NOTCHED FOR
CHUCK



can reverse it instantly as in a motorboat.

If you own a hand drill, the job is half done. The drill constitutes your motor, and this outboard is so designed that the drill can quickly be taken out and used for its original purpose at any time. The only alteration—and even this is not absolutely necessary—is extending the crank handle to give greater leverage. In the one illustrated we simply built up an extension from three sections of perforated bar borrowed from a toy-construction set. A flat iron bar will serve even better in case you can drill the holes for the bolts and handle.

The framework should be made from a piece of wood, 39 in. long, 1 in. thick and 3 or 3½ in. wide. Select some tough wood not likely to break or split. Yellow pine will do.

Saw out as shown in the diagram, and bore the two holes for the propeller-shaft bearings. These bearings, which are sections of brass tube, should be driven in to a snug fit. After being in the water a short time, the wood will swell and hold them securely in place. They do not need to be as long as the holes in the wood.

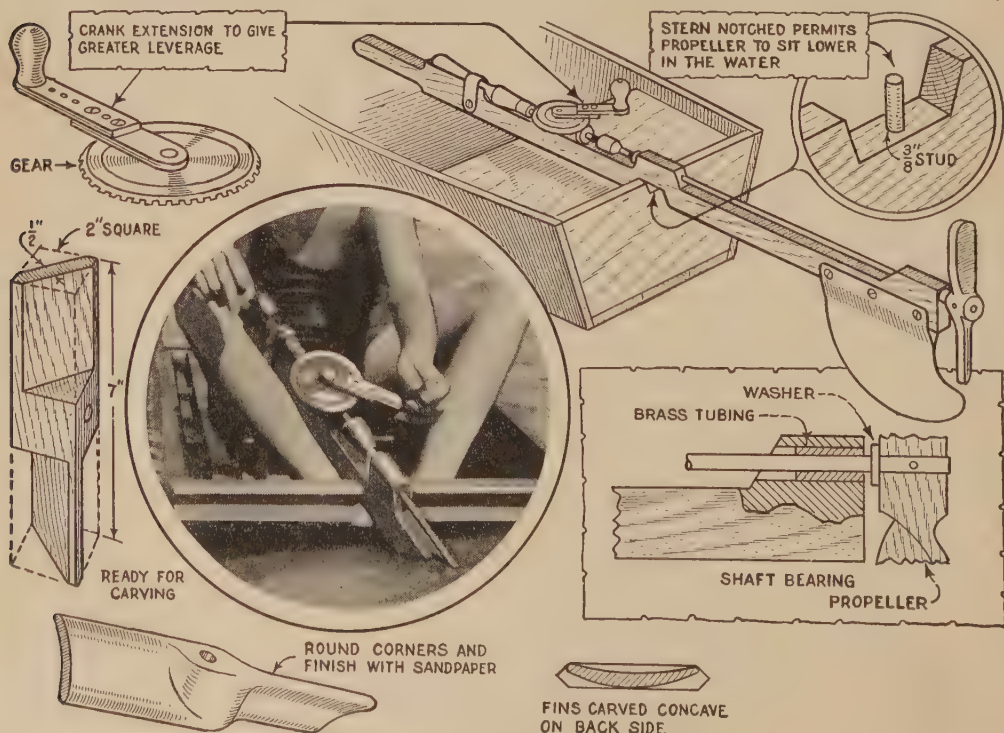
For the propeller shaft, we used a brass

curtain rod, ¼ in. in diameter, since it happened to be the only thing on hand at the time. However, a cold-rolled steel rod, ⅝ or ¾ in. in diameter, is recommended, depending upon the size of your drill chuck. The cheapest hand drill, by the way, will suffice for a light-duty motor, its only disadvantages being the noisy gears and unreliability of the chuck, as well as its inability to stand a heavy load. A big sturdy drill will be much better if you care to make the investment.

Cut the propeller shaft to 25½ in., then flatten the forward end on three sides with a file for a length of about 1 in. In the center of each flat place, file a groove, about ⅛ in. deep, running lengthwise. These grooves are to give the three chuck jaws a better grip.

The propeller is much more easily made than might be expected. Use a piece of close-grained wood, 2 by 2 in. in section by 7 in. long. Saw out as indicated by the dotted lines and bore the hole for the propeller shaft. Have this a snug fit, but not too tight, or, in forcing the shaft in, you may split the wood.

With a gouge or curved chisel, make one side of each fin concave and the other,



or forward side, convex. When finished, the fins or blades should be about $\frac{1}{4}$ in. thick. Whittle the edges all around to about $\frac{1}{8}$ in. thickness, then round them with sandpaper. With a sharp jackknife, round the hub so there will be no sharp corners or edges, and thus make it smooth and streamlined. Insert the propeller shaft so that the end is flush with the backside of hub. Now carefully drill about a $\frac{3}{32}$ -in. hole through hub and shaft and insert a nail or steel pin.

Take pains with your painting. If convenient, apply a coat of filler to the propeller and sandpaper smoothly when dry. Two coats of bright red give a lively touch, and they should be followed with two coats of spar varnish. Let each coat dry and sandpaper well after all but the final coat.

Now you are ready to fit the hand drill to the frame. It will be simple if you have the type of drill used by the writer. In this a stud opposite the center of the main gear is set in a hole in the wood frame, and the handle is clamped to a grooved section by means of a brass strap.

If you have selected a nicely grained wood for the frame, leave it in the natural finish, covering with two or more coats of spar varnish.

Cut the rudder, as shown, from a piece of galvanized sheet, as heavy gauge as your snips will handle. Paint the rudder well with bright red, same as the propeller, or a bright green. Give it two coats of spar varnish also, and, when dry, attach to the frame with screws.

The final assembly consists simply in inserting the propeller shaft in the bearings and tightening the chuck jaws over it. If your propeller blades are tilted in the right direction, as shown, the rotation tends to keep the chuck tight, so that after a few revolutions you can reverse under load without fear of loosening the chuck jaws.

We found that by notching the stern board of the boy's little boat, the propeller would sit lower in the water and at the same time be in a more convenient position for the operator. This, however, will not be practicable if the boat at your



disposal is a rented or borrowed one.

You will find the making of this little outboard an absorbing pastime during the spring evenings, and you will then be ready for a cruise as soon as navigation opens. It can be conveniently carried anywhere, and the efficiency of this sturdy little power plant is limited only by the muscles of your arm.

Cover for Auto-Tire Padlock

Mud, which gets inside of the padlock used by many car owners on their spare tire, causes considerable difficulty in opening the lock when the tire is needed. To prevent this, a cover should be provided for the lock. It can be made from a piece of thin leather, cut and folded and then sewed up the sides as shown. A coil spring is slipped over the open end, which is then turned back over the spring and

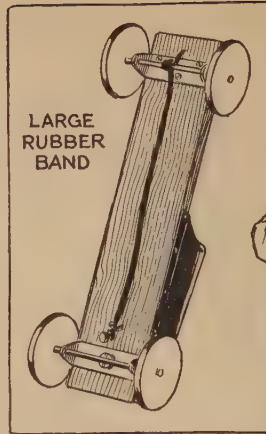


the edge sewed down, imbedding the spring in a hem. The bag is made to fit snugly over the padlock and, when finished, it is turned inside out so that all seams will be hidden. The spring holds

the bag on the lock securely and prevents mud and water from getting into it.—F. J. Wilhelm, Cincinnati, Ohio.

Toy Speed Wagon

Provided with a stout rubber band, this speed wagon will travel at a fast clip for more than 100 ft. One model has covered 250 ft. on a single winding. To make it, get four can covers for the wheels; cut 2 strips from the side of one can, bend the ends over at right angles and punch holes through them to serve as bearings for 2 lengths of wire which serve as axles. Push the wires through holes punched in the exact center of the wheels, and then solder the wheels to the axles. Cut a narrow board, about 2 ft. long, and fasten one set of wheels and axle to each end. Drive a nail in the underside of the board just behind the front axle, in the center, as shown in the detail. Get a stout rubber band and tie one end to this nail. Then wrap the other end of the band around the rear axle and turn the wheels to wind the band on it. If you stretch the rubber while winding, you can wind it much tighter. Set the wagon down on the floor and let it go. In one case the band was wound so tightly that the wheels would spin, unless a brick was placed on the wagon. To make the wagon run in a curved path, turn the front axle slightly,



Toy Wagon of Simple Construction Driven at High Speed by a Stout Rubber Band

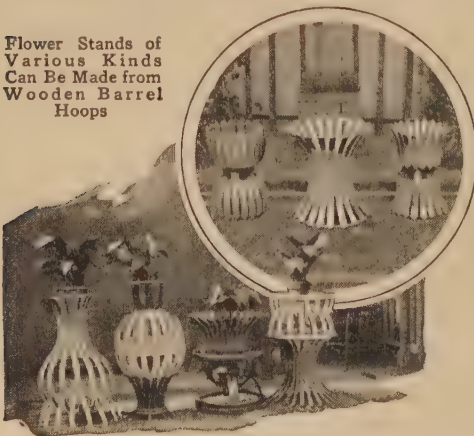


which can readily be done if it is attached by means of a screw driven through the center of the tin strip. You can also add other details, such as a hood, seat, steering wheel, radiator, etc. File all edges down so that they are as smooth as possible, and when you wind the rubber, take care not to let the wheel spin in your hand, for even a smoothed tin edge may make a bad cut.—Dale R. Van Horn, Lincoln, Nebr.

Flower Stands Made from Barrel Hoops

Wooden barrel hoops can be used for making artistic flower stands like those shown in the drawing. They can be made

Flower Stands of Various Kinds Can Be Made from Wooden Barrel Hoops



of various shapes and sizes and, when finished, are given an application of paint to add to their appearance.

Care of Automobile Doors

When you are oiling your auto, do not neglect the door hinges and latches. Many rattles and squeaks can be traced to door hinges and old anti-rattling devices. Slamming doors too violently is apt to break the door-window glass, or it may spring the door, and it is then almost impossible to prevent it from rattling. For the same reason, it is a good plan to examine the door checks occasionally.

☐ To level rough ground quickly and effectively, drag an iron rail over it, tying each end to a suitable length of chain or rope and attaching it to a tractor.

A Toy Submarine That Dives

By J. C. EDDIE

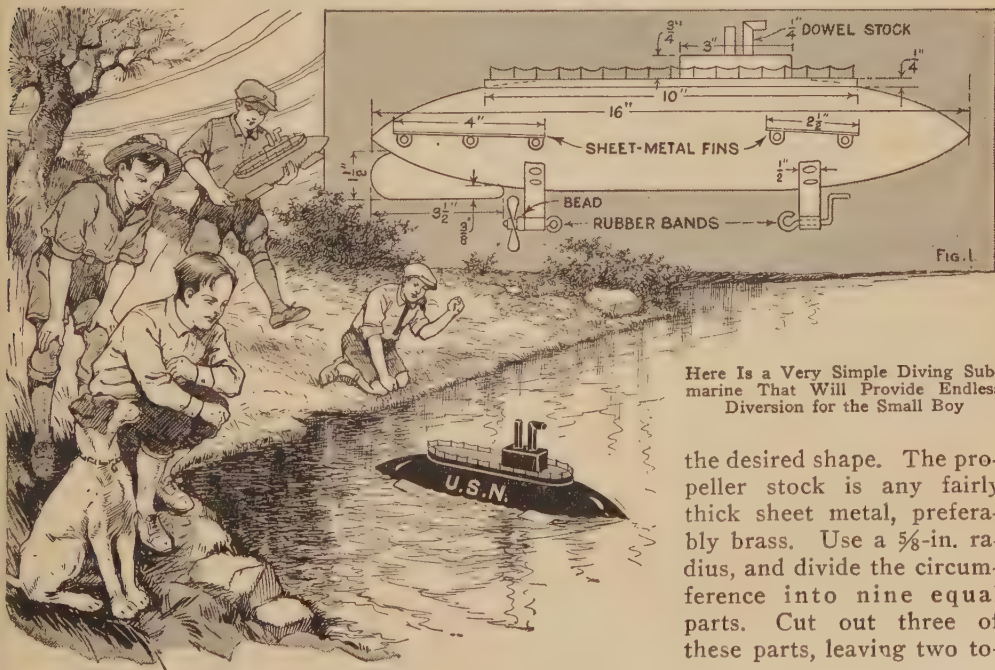
THE making of toy boats is one of the most, if not the most, popular of hobbies. This self-propelling and submerging boat gives us a little variation from the regular line of sail boats, ship models, etc. It is weighted so that the water comes within $\frac{1}{2}$ to $\frac{3}{4}$ in. of the top of the deck. With the fins shaped and placed as they are, it takes but little motion through the water to cause it to submerge. The power for propelling it is derived from a rubber-band motor directly underneath.

Obtain a block of soft wood, 3 by 3 by 16 in. in size. If you are going to use a lathe to turn the hull, about 1 in. more in length should be allowed. To make the hull by hand, first square up the work, center the ends and draw a circle on each end so that it just touches the four sides. A line drawn in the middle of each side, from end to end, may help some. Now plane the block until it is round, using the circles on the ends to gauge your work by. To shape the ends, mark the points at each end from which the hull begins to taper and, with a piece of heavy paper, draw the lines all the way around the

block. Shape roughly with hand ax and finish with spokeshave. Determine which is to be the top, and plane off a flat place $1\frac{1}{2}$ in. wide. Now, exactly opposite this, chisel out a mortise, $\frac{5}{8}$ in. wide by $\frac{7}{8}$ in. deep by 7 in. long. Drive two nails at an angle in the bottom of this groove. This is to hold the lead which is melted and poured in. Use $1\frac{1}{2}$ lb. of lead, and if this should cause the hull to sink too deeply, remove some lead by boring holes in it, thus lightening the ship.

The rudder and fins are made from not too light sheet metal, to the dimensions given, and fastened to the hull with short round-head screws at such an angle that the hull will be drawn under when in motion. The fins can be bent to a different pitch, if it is found necessary after the boat is completed and in use.

The struts to hold the "motor" and propeller are made from fairly heavy sheet metal, $\frac{1}{2}$ in. wide, shaped as in the drawing. Care must be taken to allow clearance enough so that the propeller shaft will turn freely. The shaft and crank can be made from eight-penny nails bent to



Here Is a Very Simple Diving Sub-
marine That Will Provide Endless
Diversion for the Small Boy

the desired shape. The propeller stock is any fairly thick sheet metal, preferably brass. Use a $\frac{5}{8}$ -in. radius, and divide the circumference into nine equal parts. Cut out three of these parts, leaving two to-

gether for each blade of the propeller. Round off the corners of the blades and drill a hole through the center for the

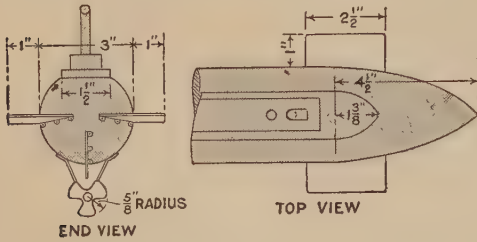


Fig. 2

shaft. Now bend the blades to such a shape that a clockwise rotation will propel the boat, and solder the propeller to the shaft. This bending or pitch can be adjusted later to conform to the needs of the rubber-band motor. A bead should be placed on the shaft between propeller and strut. The struts are fastened to the hull with four short round-headed screws.

The deck is made of $\frac{1}{4}$ -in. material, cut to the shape and size shown in the drawing. The periscope is made from $\frac{1}{4}$ -in. dowel rod. Fasten the deck with brads and screws to the flat surface on the hull. The rail is made by driving in brads at equal intervals, and soldering on some small copper wire. To finish, give the hull two coats of shellac. When this is dry, paint with aluminum paint, letter and decorate with black or red to suit.

This is exactly the way we made several models. However, due to the difference in the weight of woods, it might be necessary to make a few minor changes.

Food Chopper Used for Clamp



When you need a small clamp for odd jobs where a larger clamp is too clumsy, use the kitchen food chopper. It is set on the table or bench, upside down, and the work is clamped between the jaws.

It may be necessary to use blocks of wood to prevent the jaws from "biting" into the work.

Dressing Floor in Small Hallway

After laying a hardwood floor in a small hallway, I was at a loss as to the easiest method of dressing it, because the space was too small to use a scraper and no sander was available. I came to the conclusion that if I used a block plane to smooth the surface, I could fasten a block of wood to a weighted floor polisher, tack a sheet of No. 2 sandpaper to the block, and do a very good job of dressing. I tried it and found that it worked very well, in fact, better than I expected.—C. J. Gose, Kinderhook, Ill.

House Numbers Painted on Curbing

It is often a difficult matter to find and read house numbers from the street, especially when driving along in an automobile. In one case, where the houses were located a considerable distance from



the street, one owner painted the numbers on the street curbing in front of his house, as shown in the accompanying illustration. This was found a great improvement.

Hints on the Use of Aluminum Paint

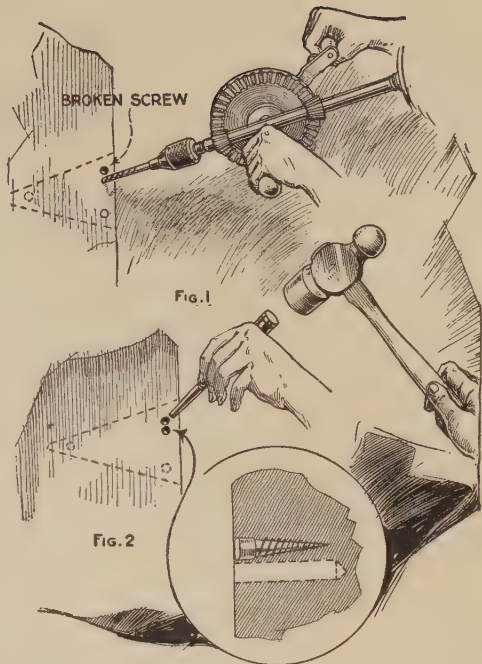
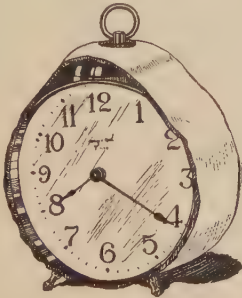
The property of aluminum paint to prevent evaporation losses has been realized by large oil-refining companies who have used it on their storage tanks. This paint reflects a great deal of heat that would otherwise be absorbed. Accordingly, this quality is used to advantage for retaining heat where it is most needed, as in boiler and engine rooms. In addition, the paint has a high degree of lighting efficiency, does not collect dirt easily, and can be cleaned readily. Its waterproofness is another desirable quality recommending it for use in dairies, garages and similar places where moisture may attack wood or structural steel.

The best general-purpose vehicle is so-called "kettle-bodied" linseed oil, diluted with an equal amount of turpentine or mineral-spirits thinner. The aluminum powder to be added is about 2 lb. per gallon of vehicle. Spar and pyroxylin varnishes can be used as vehicles to suit special conditions. When painting woodwork it is best to apply a thin coat first. This seals the pores and prevents absorption of moisture, the effect being increased greatly by the second or finishing coat. For waterproofing, a finishing coat of almost any kind and color of paint can be used, provided a good undercoating of aluminum paint is applied.

For structural steel work, the best results are obtained by priming with some of the basic lead chromates or American vermilion. Sublimated blue lead, red lead and inhibitive iron oxides may all be used under aluminum paints. Concrete and brickwork, as well as other surfaces, can be painted and waterproofed satisfactorily with aluminum paint, although, in the case of concrete, the free lime in the material has a tendency to react with linseed oil, and paints containing this oil therefore should be avoided. The best paints for such work are those made with aluminum-bronze powder in long-oil spar varnish, containing a relatively high percentage of Chinawood oil. Just enough aluminum paint should be mixed at a time for a day's work, as the covering quality of the material is reduced somewhat by permitting it to stand.

Muffling the Alarm Clock

The morning din of an alarm clock can be damped by slipping a section of an inner tube, about 3 in. wide, around the clock. The alarm will be loud enough to awaken anyone in the same room, but it will not awaken other occupants of the house. The rubber band is easily slipped on or off as required.—Willard D. Morgan, Los Angeles, Calif.



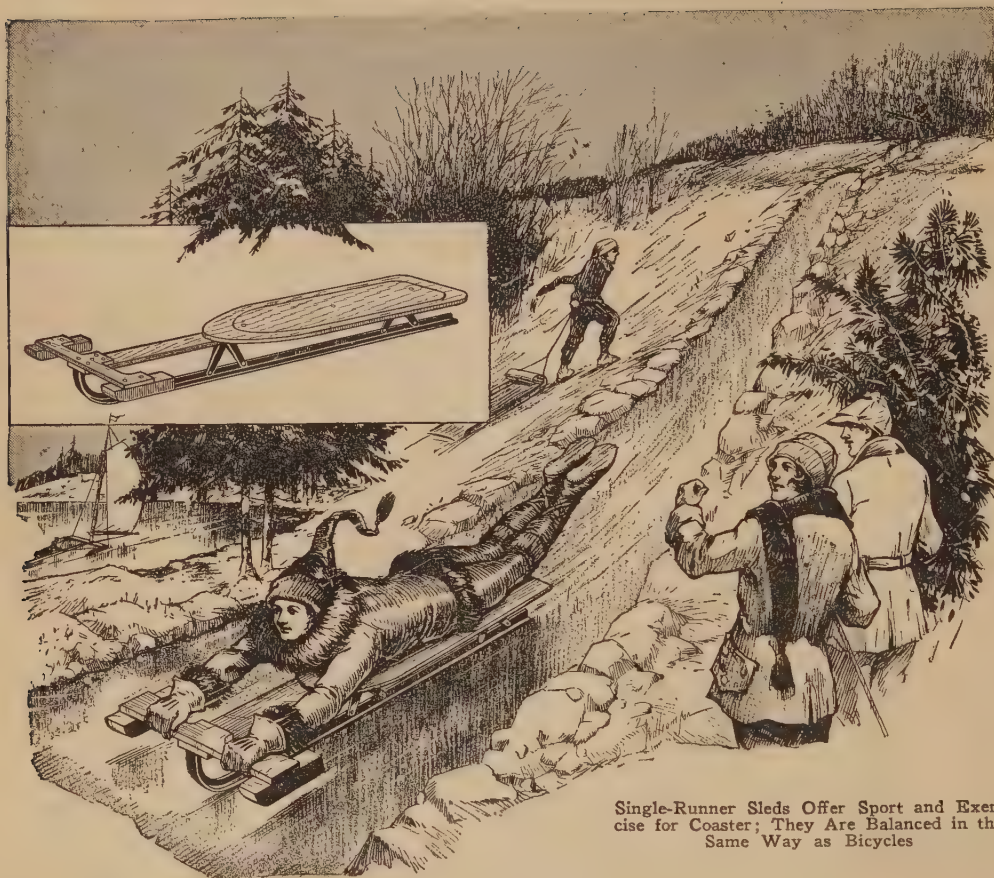
Here Is a Simple Method of Removing a Broken Wood Screw with a Punch

Removal of Broken Wood Screw

Screws sometimes break off in wood, particularly in hardwood, and it is impossible to substitute another screw until the broken one has been removed. Anyone who has experienced trouble of this kind knows the difficulty of doing this. There is a method, however, which is neither hard nor slow. A hole is first drilled beside the broken section and in line with the grain of the wood, as shown in Fig. 1. A punch can then be used to drive the broken screw into this hole, as indicated in Fig. 2, so that it can be lifted out. The hole is then filled with a wooden plug and a new screw is driven into the original hole.—G. A. Luers, Washington, District of Columbia.

Cleaning Cretonne Chair Covers

Cretonne chair covers can be effectively cleaned by using a solution consisting of two teaspoonfuls of ammonia in 1 pt. of boiled water. It is a good idea to boil a bag of bran in the water. This mixture will clean quickly and only slight pressure is required.



Single-Runner Sleds Offer Sport and Exercise for Coaster; They Are Balanced in the Same Way as Bicycles

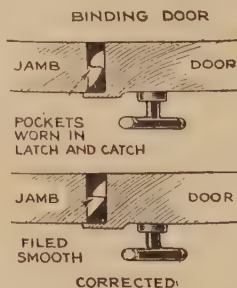
Single-Runner Sleds

Balancing like a bicycle on account of its speed, a single-runner sled affords both amusement and exercise. The runner should be of the flexible type and can be taken from any discarded sled so equipped. It is fastened to a length of 1-in. wood, 3 in. wide and the same length as the runner, by means of brackets and bolts, or rivets. A crosspiece or handlebar, made of the same material, is securely nailed to the front end, and blocks of wood, rounded at the front ends, are nailed to the bar as indicated. The body board is then nailed on. It is about 2 ft. long, 1 ft. wide and is made of 1-in. stock. It is nailed in such a position that the rider's arms will extend straight in front of him to the handlebar. When starting, the sled is balanced by the user's toes, but once under way, it will be found possible, after practice, to balance the runner almost entirely

by slight movements of the body and legs. This balancing is a bit difficult but not more so than mastering the riding of a bicycle.—L. J. Lesh, Miller, Ind.

Correcting a Binding Door Latch

Auto doors sometimes stick on account of the latch and catch being worn to the shape shown in the upper detail. This can readily be remedied by filing off both, leaving a straight surface, slightly beveled. The spring behind the latch pushes it into place snugly, preventing rattling, and the slight bevel will allow easy turning of the door handle.—Richard C. Tarr, Gloucester, Mass.



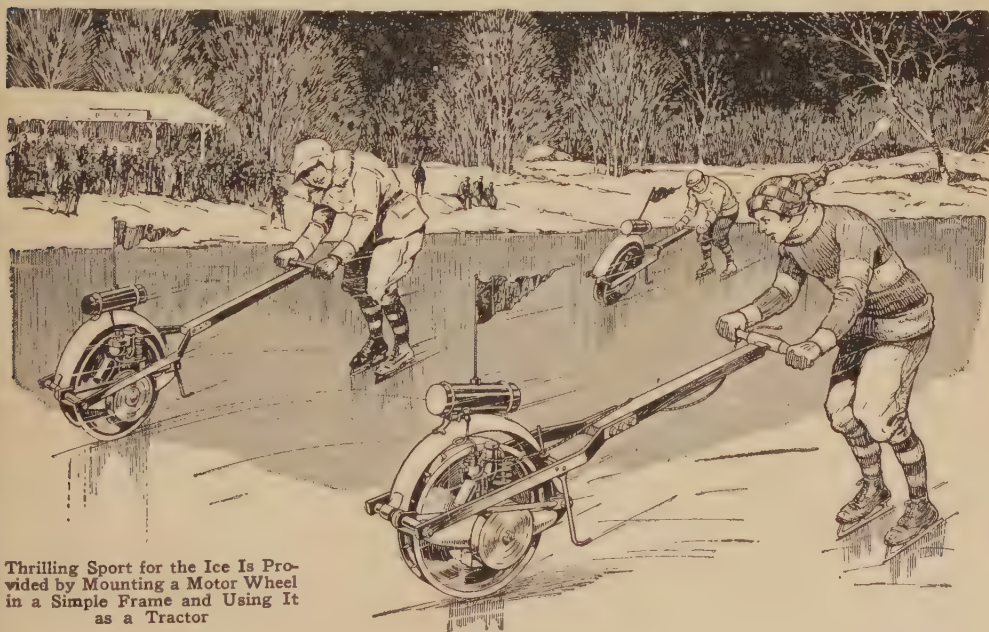


Fun on the Ice with a Motor Wheel

By LAWRENCE B. ROBBINS

EACH winter brings out some new sport. Now comes an ice tractor, a means of pulling oneself along a smooth stretch of ice with a motor wheel. Arranged as indicated in the various sketches, such a tractor is capable of pulling one person over the ice at a speed of 30 to 35 miles an hour. With several persons in a line, holding on to each others' belts, it will pull them along at reasonably good speed and give all the thrills of "snapping the whip," single-file skating and like stunts. No changes are necessary in "installing" the motor wheel for this tractor. Just remove it from the bicycle, substitute sharpened spikes for the tire, pivot the wheel in the frame, and off you can go.

Make the riding frame first. It consists of two pieces of stiff flat steel, $1\frac{1}{2}$ in. wide by $\frac{3}{8}$ in. thick, their length depending on the distance from the pivot hole for the wheel to a point about 3 in. behind the rear end of the mudguard. At that point bend the pieces in and then out again, parallel to the longer portions. When brought together, they form the sides of a fork. Drill three holes in the short ends to coincide with each other, and then bolt to the ends of a lawnmower handle that will serve as steering bar. The distance between the long portions of the irons should be sufficient to clear the sides of the motor wheel easily when it is placed between them.



Thrilling Sport for the Ice Is Provided by Mounting a Motor Wheel in a Simple Frame and Using It as a Tractor

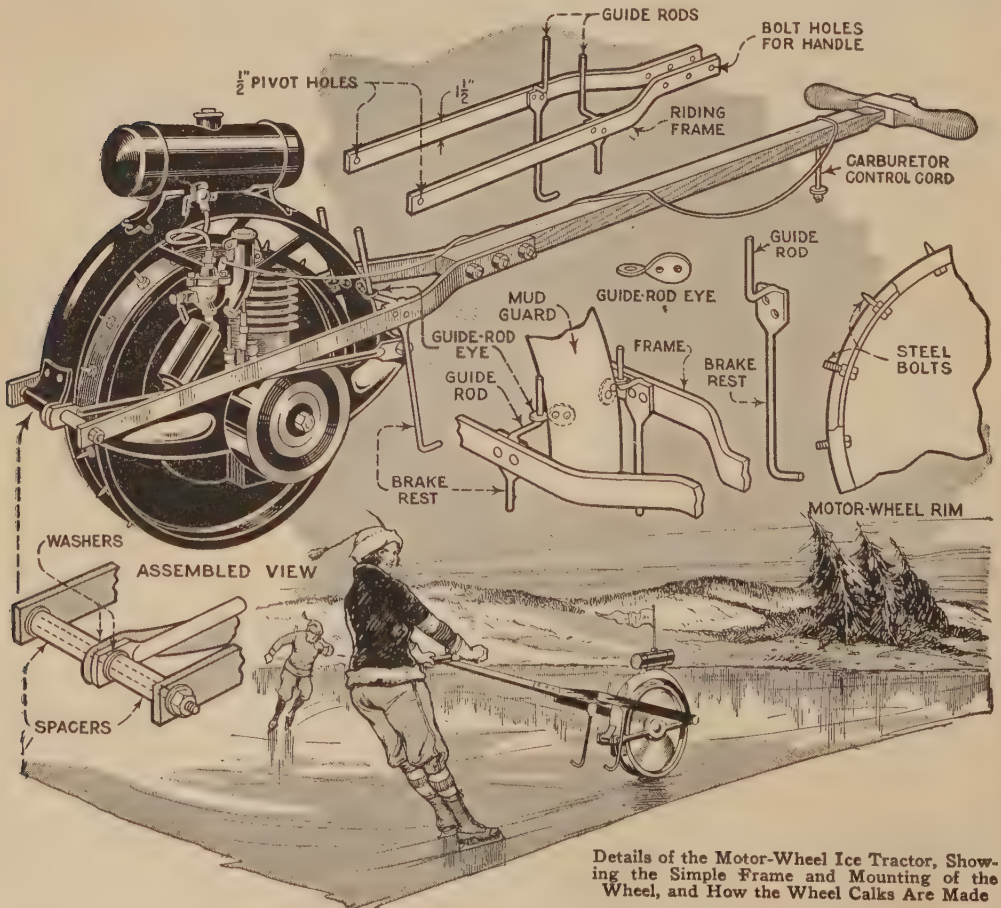
Pivot the wheel to the ends of the bars by drilling a $\frac{1}{2}$ -in. hole in each end and then running a $\frac{1}{2}$ -in. round-iron bar through these holes and the pivot hole in the front end of wheel frame. Two pieces of pipe should then be cut to fit loosely over the rod and act as spacers keeping the wheel properly centered between the sides of the frame. Their length and fit must be determined by experiment. Thread the ends of the rod and use washers at the ends of the pipes and under the nuts that secure the rod in place. When properly assembled, the outfit will appear as shown in the detail sketch.

Now make two guide eyes and rivet one to each side of the mudguard at the rear of the wheel. A $\frac{5}{8}$ -in. eye will do, and can be fashioned from flat steel, as suggested. Twist the metal, if necessary, so the flat of the eye is horizontal.

Two guide rods should then be fash-

ioned from round iron, with a flat portion near the middle to rivet to the inside of the riding frame directly opposite the eyes. A close study of the drawing will show that these rods are bent in at right angles and then vertical and with a slight curve forward, so the eyes will slide over them if the handle is dropped down. This adjustment will necessarily have to be made to suit the occasion and by trial. The lower ends should be exactly the same length and the ends turned back at right angles, as shown. These are to act as rests for the wheel when not in use and as brakes when stopping. They should be 3 or 4 in. clear of the ice when the handle is held up by the user.

Remove the tire from the rim and put it away until summer. Then drill 16 to 18 small holes equidistantly around the center of the rim and fasten in them as many steel bolts with their ends projecting about



Details of the Motor-Wheel Ice Tractor, Showing the Simple Frame and Mounting of the Wheel, and How the Wheel Calks Are Made

1 in. through the rim. Two nuts will hold each bolt securely. File each bolt to a short, sharp point, and you will have sufficient spikes to give good traction.

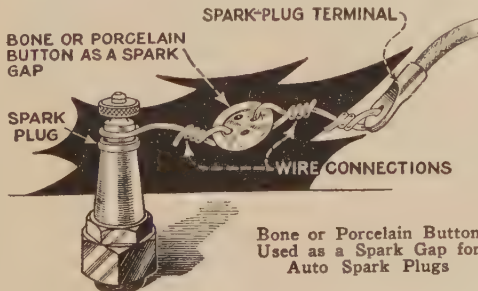
Lead the flexible carburetor control to the handle and lash it in place where it will be always under the operator's hand. An empty brass rifle shell can then be soldered to the gas-tank cap (not to the tank), if desired, to act as a socket for a small flag. Remove the cap from the tank, while soldering. Headlights can be added to the front of the frame and operated from three dry cells suitably placed, and a horn may also be attached.

The motor-wheel tractor normally should rest on the spiked wheel and the two legs provided for the purpose. When ready to use, grasp the handle in both hands and open the carburetor throttle. Then push the machine ahead as rapidly as possible by digging the spike points into the ice and running ahead. When the motor starts, the user can settle back on his skates and regulate the speed by the control. Turns can be made by slightly tipping the wheel in the direction one wishes to go but not far enough to prevent the spikes in the wheel from gripping the ice. When a stop is to be made, simply shut off the gas and lower the handle until the rests or brakes drag. This, with the compression of the dead motor, will bring the outfit to a stop very quickly.

Spark Gaps from Buttons

When making engine tests it is desirable to have some visible check on the operation of the ignition system. A simple means of forming spark gaps at the plug is ordinary bone or porcelain buttons, with the spark-plug wires attached to them. The wires are slipped through the eyes of the button, forming a gap through which the circuit will pass.

When testing engines, it will be obvious that the absence of a spark at the gap accounts for missing, while, with the spark perfect and the missing still evident, the carburetion is at fault.



Spring Hooks for Ironing Board

Holding the cloth tight on an ironing board can be done by means of the spring



Simple Spring Hooks Which Keep Cloth on Ironing Board Securely

hooks shown in the accompanying illustration. Each of these consists of a coil spring, equipped at both ends with a hook made of stiff wire. Points are filed on the ends of these hooks, which should be done before they are attached to the spring, and bent at the ends as indicated. The straight lengths of wire, with sharpened ends, are slipped through the ends of the spring, and bent around, forming a loop which holds them to the spring securely. A pair of pliers is used to bend the points into hooks and the device is then ready, the manner of its application in use being obvious from the illustration.—H. H. Siegele, Emporia, Kans.

¶ Vaseline or cold cream, rubbed well into the hands before doing grimy work stops the dirt before it reaches the skin, so that you can wash them clean easily.



Blowing Large Soap Bubbles with the Aid of an Old Inner Tube

Blowing Giant Soap Bubbles

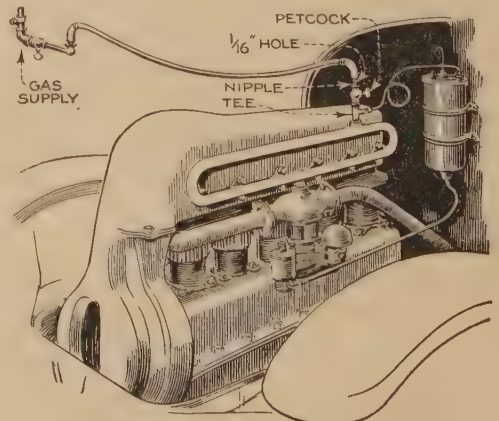
Blowing big soap bubbles is a lot of fun, especially if the novel method of blowing them by means of an inner tube is used, as shown in the accompanying drawing. Make a small slit in an inner tube directly opposite the valve stem. Then push a second valve stem through this slit and take up on the nuts so that no air will leak out. Remove the inner section of the valve and force the end of a length of rubber tubing over the end. Insert the stem of a clay pipe in the other end of the tubing. The tube should be held closed with a spring clothespin or clip. Pump up the inner tube with an air pump so that it will be well filled but not so far as to blow out the extra valve stem. Dip the pipe bowl in the solution, and hold it steadily down on a table, bowl up. Then release the air from the inner tube by easing up on the spring clip. When the bubble has formed and is growing nicely under a small stream of air, leave the clip in that position. In this way the bubble will grow without jarring or shaking and reach its maximum size. Use a good

soap solution into which a little glycerin has been dropped.—L. B. Robbins, Harwich, Mass.

Natural Gas for Starting Automobile

I have had several cars of the same make and somehow none of them could be started easily in cold weather. The trouble was, however, readily overcome by connecting the natural-gas house line to the intake, as shown in the illustration. Set the choke and turn on the gasoline line for starting and also turn on the gas. A few turns of the engine is all that is necessary to start it. This method saves both battery and temper. The gas connection may be made at any convenient place so that

it will suck through the manifold. A convenient way to do this is to replace the elbow on the intake, on the vacuum-tank suction tube, with a tee; into this screw an ordinary gas cock, and above this a nipple, onto which the rubber tube from the house line can be forced. Note the small $\frac{1}{8}$ -in. hole in the nipple to allow air to be taken in with the gas.—Louis F. Busch, Cincinnati, Ohio.



Using Natural Gas to Aid in Starting Auto during Cold Weather



Skate-Sailing Is Thrilling Sport

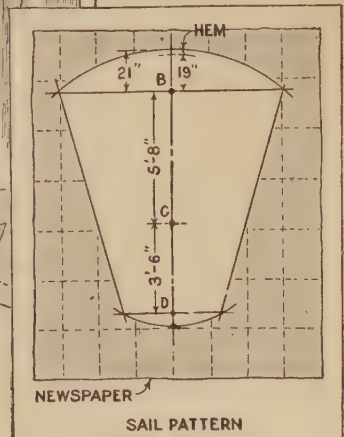
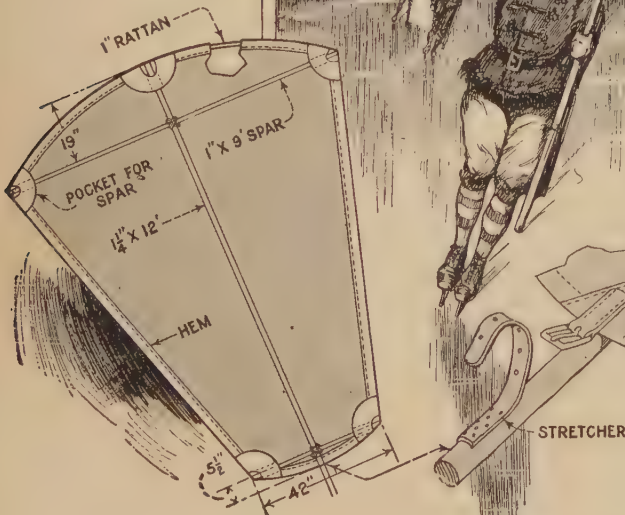
By SAM BROWN

SCUDDING to leeward with the speed of an ice yacht, tacking to windward with all the nautical nicety of a center-board skiff, feeling the tug of fifty square feet of taut canvas veering into a spanking breeze—that's the thrill that comes with the skate-sail. You don't have to be a wonderful skater, or a good sailor, either, to go skate-sailing. All you need is the sail, the necessary expanse of slate-gray ice, and a moderately strong pair of ankles, and then, if you hold the sail—no matter how—you are bound to glide off in one direction or another.

And how! Don't be surprised to find

yourself "sailing" all over the ice on some portion of your anatomy other than your feet. But don't let that discourage you. Skate-sailing, like skiing and skating, is a sport that comes bump by bump, but it is only through experiencing these beginner's mishaps that you can later enjoy the gliding swiftness, the sensation of flying, and the thrill in maneuvering that comes with the skate-sail.

In taking up skate-sailing, the first thing to do is to make the sail; and the first thing in making the sail is to cut a paper pattern of the sail proper. This can be conveniently done on 36 sheets of



newspaper, pasted together as shown in the pattern drawing. Down the center of this pasted sheet, draw a heavy black line. On this line, close to the top, mark a dot to represent the sail top. From this dot, measure down on the line the distances indicated, and make dots B, C and D.

Draw lines at right angles to dots B and D, the upper one 9 ft. long, and the lower 42 in. long. Now, fasten a piece of string to a thumbtack, and insert the tack through the paper at the dot C. Fasten a pencil onto the string at the proper distance to draw an arc through the ends of the 9-ft. line, and then, still using the point C as a center, swing another arc through the ends of the 42-in. line. Draw lines connecting the intersections of the cross lines and arcs, and you will have a full-size pattern of the skate-sail.

The actual sail is then sewed together, using this paper pattern as a guide, and allowing 2 in. all around for hem. Material for the sail can be either 3-oz. zephyr cloth, 3-oz. duck, Egyptian cotton, balloon silk, or any other light, strong material.

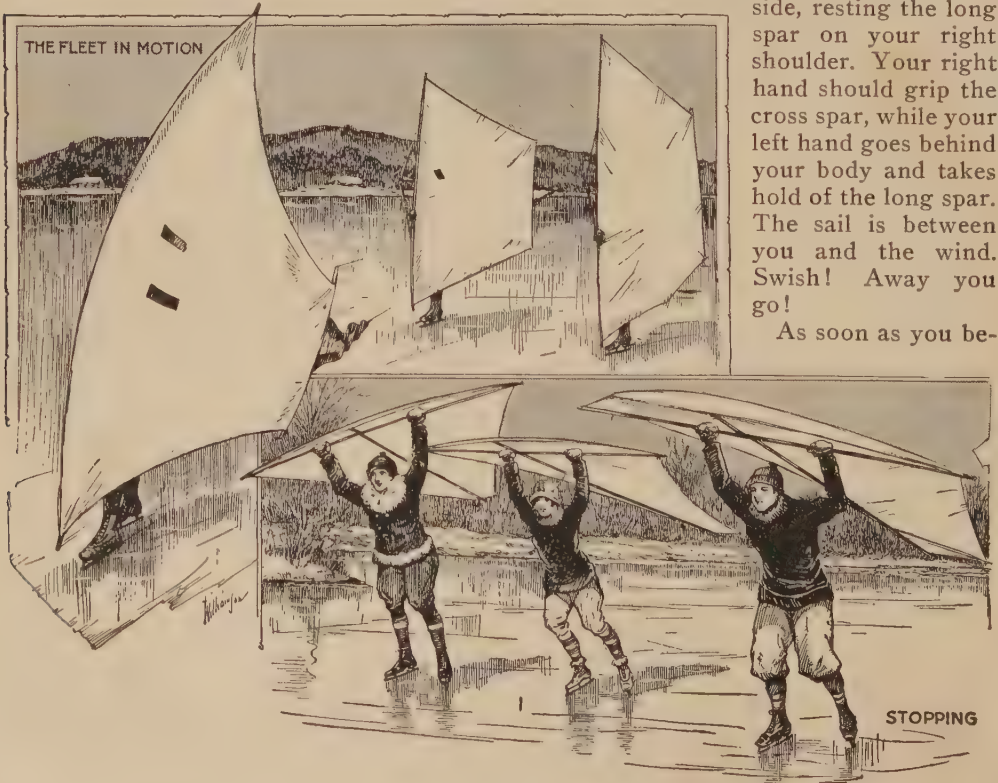
Next in order come the spars. These should be cut from spruce, to the dimensions shown, and should be shaved down so that they taper slightly from the center to the ends. Pockets of light leather or very heavy canvas should be sewed to the sail to receive the ends of the spars. A stretching harness is made from straps, as shown in the sketch, and fastened to the sail at the lower end. Both the curved portions of the sail, at the top and bottom, are reinforced by having a length of light rattan inserted in the hem. Leather straps, or strong whipcord lashings, fasten the spars together where they cross.

So much for the sail. The other part of your equipment is, of course, the skates. Have these as long as possible; at least nothing shorter than the regulation 15-in. speed skate.

To learn to use the skate-sail, choose as smooth a stretch of ice as possible, and a day with a fairly stiff breeze. Hold the sail at arm's length over your head, both hands grasping the cross spar, and skate out on the ice. Face the wind. Bring the sail upright against your right

side, resting the long spar on your right shoulder. Your right hand should grip the cross spar, while your left hand goes behind your body and takes hold of the long spar. The sail is between you and the wind. Swish! Away you go!

As soon as you be-



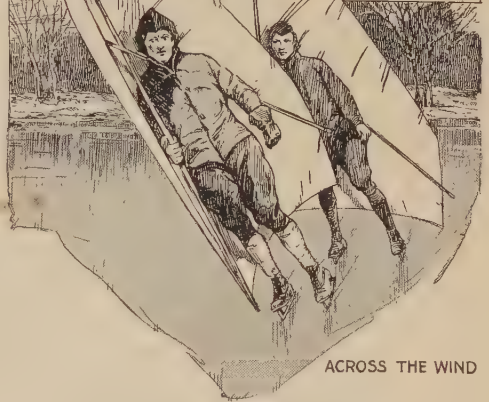


gin to feel that you are exceeding the speed limit, or your legs begin to vibrate from the rough ice, swing the sail flat over your head, and you will very soon come to a stop.

One of the first things you will learn in navigating with the skate-sail is that the sail must never be held as a point-blank target to the wind. Why not? Simply because the skate-sailor travels faster than the breeze. To illustrate: Suppose there is a 17-mile wind blowing. The inexperienced sailor, thinking to take full advantage of this, holds the sail directly at his back, presenting a point-blank target to the breeze. Of course he goes off like a shot, and gradually increases speed until he is going about $21\frac{1}{2}$ miles per hour. What happens, then, to the 17-mile-an-hour breeze? It cannot keep up with the sailor, and the result is that there is a sudden vacuum behind the sail, which is often of such intensity as to cause the sailor to lose his balance.

The correct way to sail before the wind is to hold the sail at a very slight angle away from the breeze, so that you zigzag down the wind instead of scudding directly before it. You go just as fast, and, because you are running more or less across the wind, you eliminate the disturbing factor of artificial "air pockets."

When you travel this zigzag course to the right, the sail is carried on the right shoulder, and with the right foot forward. When you desire to veer off to the left, the sail is rolled across your back, keeping the tail end low, so that the long spar



comes down on your left shoulder, while your foot position is changed so that the left foot is to the fore.

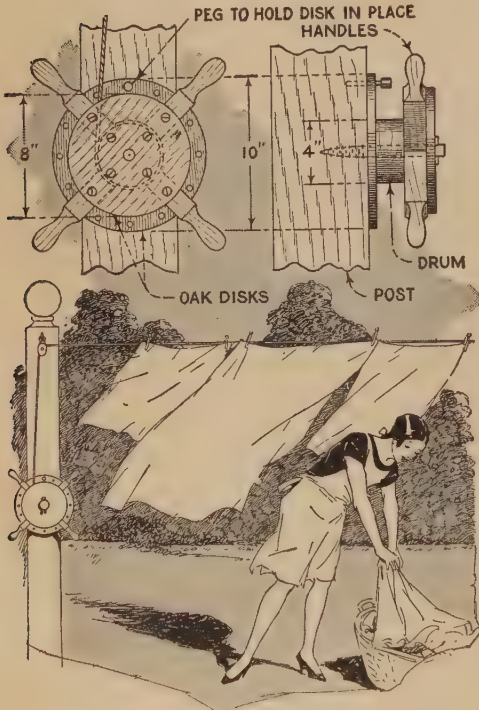
You will speedily learn that you can go directly across the wind, that is, at right angles to it, by slanting the sail a little and leaning against the wind. When sailing in this manner, your skates, biting into the ice, act in the same capacity as leeboards on a sailing canoe, and prevent you from "drifting."

By slanting the sail still more away from the breeze, you will find yourself practically going against the wind. That is, the breeze will be coming direct from the north, and you will be sailing northeast. This is nautically known as "beating to windward," and your northeast course is called a "tack." After you have covered a fair distance on the northeast tack, you start on the northwest tack, and by alternating these two directions you eventually arrive at your destination, due north.

In beating to windward, it is necessary,

when changing tacks, to alter the position of the sail, so that it is always between you and the wind. To do this you swing around into the wind, which frees the sail from your body, then quickly lift the sail, flat, over your head, and lower it on the opposite side to carry you off on the next tack.

Detachable Clothesline Reel



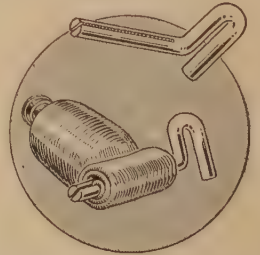
Simple Homemade Clothesline Reel Which Holds the Line Taut and Secure

The clothesline reel shown in the illustration was designed by a woman who knew just what she wanted in the way of such a device. It can be adjusted to hold the line at the proper tension, is simple to make and can be instantly detached from the pole and carried in the house to keep the line dry in damp weather. The reel consists of a hardwood drum, 4 in. in diameter. On the back of the drum a hardwood disk, 10 in. in diameter, is fastened. Two hardwood handles, crossed and mitered at right angles, are fastened across the front of the drum, as shown. Over the handles a second hardwood disk, 8 in. in diameter, is attached. Disks, han-

dles and drum are concentric with each other. A $\frac{5}{8}$ -in. hole is drilled through the exact center of the assembly and small holes 1 in. apart are drilled around the edge of the 10-in. disk. A lagscrew is driven into a convenient clothes pole 4 ft. from the ground, the head is filed off and a small hole is drilled through the end for a cotter pin. A pulley is also fastened to the top of the pole above the bolt. With the clothesline reeved through the pulley and run through holes in the other poles, the reel is placed on the bolt and the cotter pin inserted to prevent it from coming off. Then the line is reeled in until tight and a steel pin is inserted through one hole in the back disk into a hole in the pole. This holds the line taut. By removing the cotter, the reel can be instantly removed.—L. B. Robbins, Harwich, Mass.

Squeezing Paste from Tubes

A large percentage of paste used in tubes, such as toothpaste, shaving cream, glue, etc., is wasted, as it cannot be entirely squeezed out with the fingers alone. A device such as the one shown in the drawing will prevent this waste and can be made as follows: A short length of metal rod is slit down one end with a hacksaw, $1\frac{1}{2}$ or 2 in. being sufficient for the average tube. The other end is turned over and bent to form a handle. The slitted end of the rod is slipped over the flat end of the tube and the handle is turned. This will force all of the contents from the tube. When the tube is entirely rolled up, the crank may be pulled out and used for other tubes.—L. J. Flugel, Chicago.



¶The life of a floor broom can be increased considerably if it is given the following treatment every week: Dip it in a pail of hot soapy water, dash up and down several times and set it some place where air will circulate about it for some time. By doing this the fibers will not break off so easily.

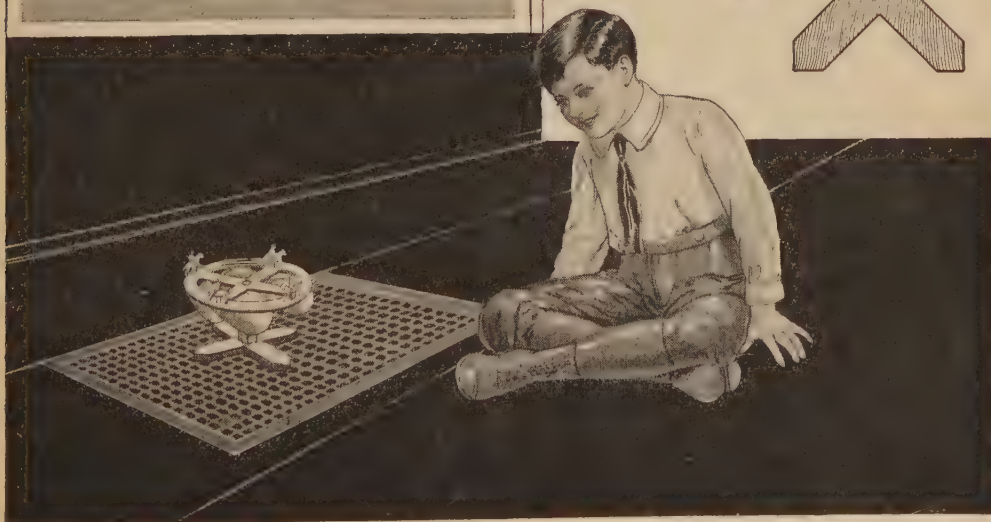
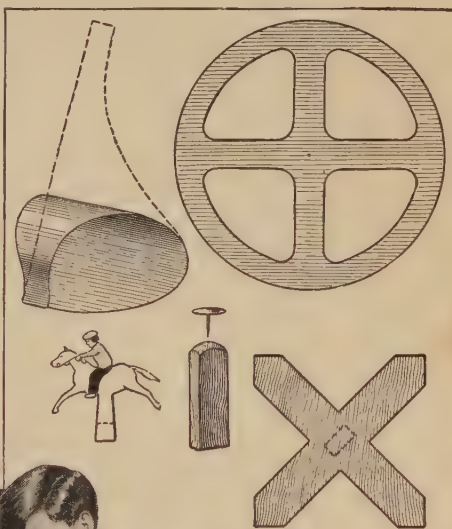
A Simple Toy Merry-Go-Round

By DICK HUTCHINSON

NEARLY every child desires toys with motion. Toys having spring or rubber-band mechanisms are, as a rule, rather short-lived, but the hot-air-propelled merry-go-round, shown in the illustration, will last indefinitely, provided, of course, it is well taken care of.

From medium-weight cardboard cut a 5-in. disk and remove the four sectors, as shown in the upper right-hand detail. Then cut four pieces of ordinary writing paper to the shape indicated by the dotted lines of the detail, and bend them over to

form fans, using glue to hold the overlapping edges together. Glue one of the fans to each of the four crossbars, as in the photo at the left. From a piece of $\frac{1}{2}$ -in. soft wood cut out a base with four extended feet. In the center of the base nail a small post, about 2 in. high. This should be rounded and given a high polish on the top end to reduce friction, as it forms the bearing upon which the disk or wheel revolves. Place the latter on top of the post, balancing it carefully. Fasten it by means of a thumbtack, pressed



Toy Merry-Go-Round Which Whirls at a High Rate of Speed over a Hot-Air Register, Fans on the Toy Catching the Draft and Propelling It

straight into the center of the post, being careful to allow a little play to permit the platform to rotate easily and enlarging also the hole in the wheel a trifle so that the paper will not bind on the thumbtack.

To complete the toy, cut four mounted horsemen from a piece of medium-weight cardboard, bend the base as indicated by the dotted line of the detail, and glue the base to the wheel so that each figure stands

upright and is headed in the direction that the platform will turn. The horsemen must be all exactly the same size and must be distributed on the wheel to balance it. The same, of course, applies to the location of the fans. To operate the toy it is merely placed over a hot-air register and the draft will cause it to rotate, the rate of speed depending on the amount of draft coming up through the register.



Set Fishing Line on the Ice Has a Number of Leads and Pivoted Flags Which Indicate When Fish Are Caught

Automatic Indicator for Set Fishing Lines on the Ice

Fishing through the ice during winter is usually a cold sport, especially when one has a set line with a number of leads attached, as it is necessary to go from one lead to the other to examine each separately. This objection, however, can be overcome by using an automatic indicator, as shown in the drawing. Two posts are set up, a slot is cut in the top of each, and a short 1 by 2-in. stick with a flag attached, is pivoted in the slot, the set line being attached to the lower end

of the flag sticks. The line is run through a staple or screw eye so that a pull on the line will cause the flag to rise. When no pull is exerted, the flag drops down again. A number of leads, with sinkers and hooks, are provided, the weight of the leads not being sufficient to raise the flags. When a fish is caught there will be a quick jerk and one or both flags will go up. The lead where the fish is caught can then be easily seen. The fisherman can skate around to keep warm and still keep an eye on his lines.

Homemade Academy Board

Art students use quantities of academy board for painting in oils because it is cheaper than canvas. An excellent board, somewhat similar to this, can be made at home for little or nothing. Get some junkboard or equally heavy cardboard, such as is used to hold lace-curtain stock. Pieces of light-weight wallboard will be satisfactory. Size one surface and allow it to dry. Then spread on a coat of thick paint with a pallet. When two pieces are covered, place the painted surfaces together and then pull them apart carefully. This will give the pieces an even but rough-toothed surface, after which they should be laid down flat and allowed to dry.



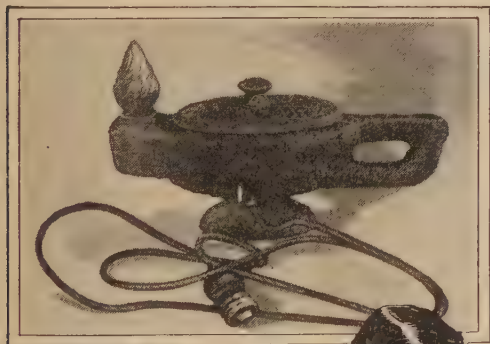
An Electric "Aladdin's Lamp"

By DICK HUTCHINSON

ONE of the most interesting novelties that the home craftsman can make in his leisure moments is an electric "Aladdin's lamp." By consulting the illustrations and following the instructions, anyone can make this simple and attractive lamp, and equip it for electricity at the cost of a few cents.

It is made of white pine, a number of pieces being cut out of $\frac{7}{8}$ -in. material, according to the design and dimensions

given in the patterns. All the pieces can be cut out with a coping saw, although a band saw may be used if available. First cut out an oval, 3 in. wide and $4\frac{1}{2}$ in. long, as shown in detail A. This forms the base of the lamp. Round off the upper edge with a jackknife or wood file. Glue and nail the small oval B to the first piece, exactly in the center. Now cut piece C, which is also rounded on one edge, then glued and nailed to B, with the rounded edge down. The next two pieces, D and E, are cut out and attached in the same way. Round the under edge of D. Both the upper and lower edges of piece E, which forms the top, should be rounded. Cut out a handle as shown in detail G, round the edges, and glue and nail it in place. The piece F serves as a cover and should be well rounded on the top edge, while the bottom edge should be grooved about $\frac{1}{4}$ in., so that it will set down slightly in the lamp body. A small knob is glued to the center of the cover, more



Gesso-Covered Electric "Aladdin's Lamp," Finished in Antique Colors and Provided with Natural-Flame Lamp, Makes an Attractive and Ornamental Piece for the Mantel

for the sake of appearance than because it will be of any service.

Get an ordinary keyless light socket, remove the cap and wire the socket. Remove the black fiber from the cap and slip it over the wires and up against the bottom of the socket, to insulate the wiring. Set the socket in place and run the wires back through the opening and into the box. Shape a piece of cardboard to



Patterns and Dimensions of the Various Pieces of $\frac{7}{8}$ -in. Wood, Which Are Glued and Nailed Together to Make the Body and Cover of the Lamp, the Edges Being Rounded and Gesso Applied over the Entire Surface

plug for connecting it to the house-lighting supply at a wall socket.

A bulb in the semblance of an ordinary candle flame should be screwed into the socket in order that the idea of an ancient oil lamp may be carried out as realistically as possible.

Cleaning Hot-Water Reservoir of Silt and Dirt

cover the opening under the socket, and glue and tack this in place. Drill a $\frac{7}{16}$ -in. hole up through the side of the body of the lamp and insert a fiber bushing of the kind used in fixtures.

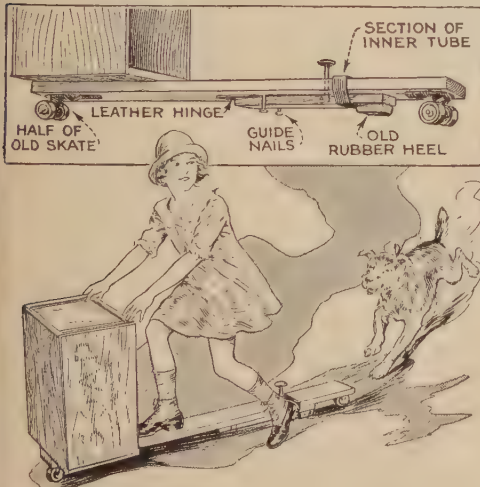
The lamp is now ready for a coating of gesso. Pour about $\frac{1}{2}$ pt. of liquid glue into a receptacle and into this stir enough ordinary whiting to make a thick putty. Add 3 or 4 spoonfuls of linseed oil, and then stir in more of the whiting to make a good workable putty. With an ordinary pocketknife, pack sufficient putty around the socket to hold it firmly in place. Then cover the entire lamp with the putty, with a more or less rotary movement, to produce a rough effect. When completed, let it set for a day or so to dry, then go over with bronze and, after this has dried thoroughly, paint with antique red ground in japan. Rub up the high lights with a soft piece of cloth. Then with a piece of cloth dipped in antique green, ground in japan, rub over the entire surface lightly, or just sufficiently to give it the appearance of old bronze. Pull the light cord out through the fiber bushing and attach a

Where we live in the west, the water supply comes from the mountains and carries adobe to a marked degree, especially during the spring of the year and after a rain, which occurs almost every afternoon at our altitude of 8,000 ft. We use considerable water, and the reservoir of the kitchen range has to be filled four or five times a day. After every emptying there is about 2 in. of dirty water that has to be removed. The range is used all day and sometimes also during the night, so that the reservoir is always hot. Taking out the dirty water was therefore a painful task, until one day when the car was being washed, it occurred to me that a big sponge would be useful to soak up the boiling water in the dirty reservoir. I got a pie-tin lifter and proceeded to drop the sponge into the boiling, silty water, removed it and submerged it in a

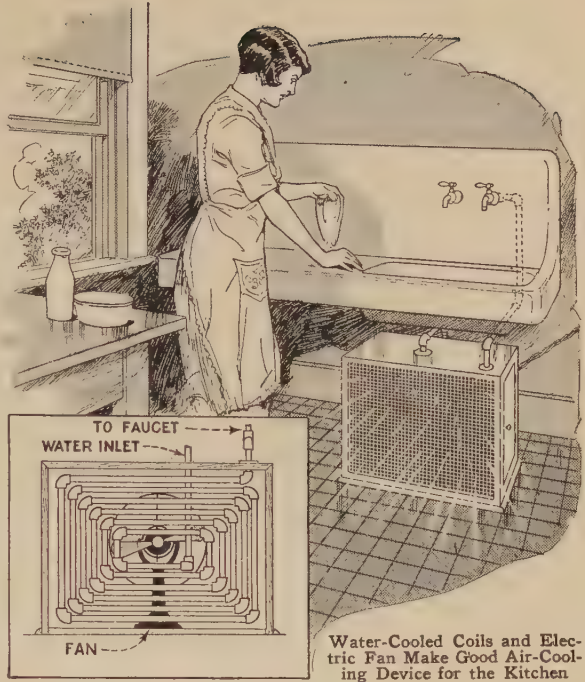
pail of cold water. Then I squeezed all the water out of the sponge and repeated the operation a few times until the reservoir was empty.—Winifred Mc-Millen, Ridgway, Colo.

Foot Brake for the Scooter

Nowadays, homemade soap-box scooters have found particular favor among the kiddies, but their use has certain disadvantages. They help wear out shoe leather remarkably fast, as the feet are used both for braking and propulsion. To avoid some of this unnecessary wear, the brake shown in the drawing may be provided. It consists of a strip of wood, fastened to the underside of the scooter by means of a leather hinge. An old rubber heel is nailed to the other end of the brake, a section of inner tube is provided to keep the brake off the ground, an old valve stem is used as a pedal to press the brake down, and two guide nails are driven on each side of the brake to hold it in position. In use, the child presses on the pedal, which causes the brake to bear down against the sidewalk. This stops the scooter in a short distance, depending on the speed and the pressure on the brake.—Earl E. Moffat, Los Angeles, Calif.



Children's Soap-Box Scooter Can Be Improved by the Addition of a Brake



Water-Cooled Coils and Electric Fan Make Good Air-Cooling Device for the Kitchen

Device for Cooling Kitchen Air

During summer, the kitchen is usually a warm place and, although a ventilating fan will remove hot vapors, it does not cool the air. This, however, can be accomplished by means of a set of cooling coils placed in front of an electric fan, as shown in the drawing. The coils are made of water pipe and fittings, and the device is cut into the cold-water main so that the water flows through the coils before it gets to the faucet. This practically insures a supply of fresh, cool water in the coils. The fan circulates air between the coils and in the room, moderating the heat considerably. It is, of course, advisable to inclose both the coils and the fan in a box with two screened sides.—Kenneth Coggeshall, Webster Groves, Mo.

Improving the Bread Knife

Few bread knives cut fresh bread well and with regularity. This trouble can be overcome quickly in the following manner: Place the knife near an open stove-burner flame, not on the fire but close to it so that the blade will get warm. Then try it on the fresh bread.

Auto Steering Wheel on Bicycle

The usual type of bicycle handlebars were not satisfactory to Paul Webber of



Old Automobile Steering Wheel Substituted for the Customary Handlebars on Bicycle

Bedford, Mass., so he removed them and substituted a steering wheel taken from an old Ford. This, he says, is much better than the customary handlebars.—Arthur F. Egan, Boston.

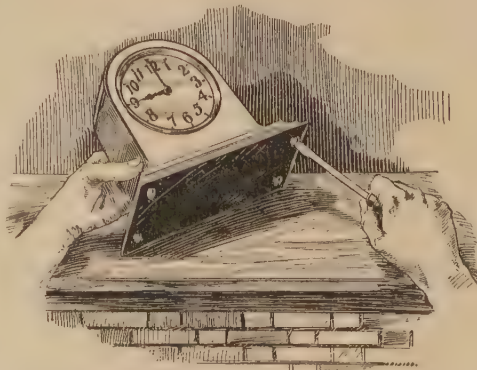
Steam Removes Wall Paper

I have just accomplished a difficult feat in the removal of paper from the wall of a room in which the first paper had been varnished after it was put on, about 40 years ago, and then papered over that thickness one to three times. The last thicknesses resisted strongly because the paperhanger apparently had used a little glue in his paste when he hung the paper. Warm water was used, but that was a slow process except where there was but one thickness over the varnished paper. I tried a commercial preparation to soften the

outer layers, as well as the varnished layer, but it was even then a very slow process. I finally conceived a plan to soften the paper with steam and this worked to perfection. I took a small teakettle and boiled the water on the stove. I filled the kettle about one-quarter full so that the steam would come out of the spout freely. Then I wired the kettle to a one-burner electric stove and switched the current on full. The kettle continued to boil and emit a full stream of steam. I then placed the nose of the spout within $\frac{1}{2}$ in. of the paper and the steam penetrated very readily, permitting the removal of the paper with a putty knife or scraper. The outer layers came off readily, and the varnished paper was softened so that I could work continuously. The electric cord was plugged in the baseboard socket and the wall sockets so that I could reach every part of the wall. As the kettle handle prevented steaming the paper near the ceiling, I added a short piece of rubber tubing at this point, and finished the work in a short time.—Harry E. Gifford, Medford, Mass.

How to Level a Clock

Most clocks do not run well unless they are set exactly level and this is sometimes a difficult thing to do, especially if one has no level. Most people raise one side of the clock up by means of a piece of cardboard or bits of paper stuck under the feet, but these often shift. A better method is shown in the drawing. Drive four small round-head screws in the bottom of the block and adjust them so that



Round-Head Screws in Base of Clock, When Properly Adjusted, Make It Stand Level

the clock stands perfectly level. Set the clock on a piece of cloth or felt to prevent the screw-heads from marring the mantel top.

♣ Split an inner tube and cut cross-ways in two pieces. Tack or glue the pieces together, one on top of the other. This mat saves foot ache when ironing.

TWO HOMEMADE TOYS for CHRISTMAS

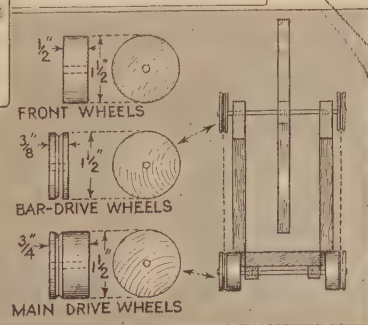
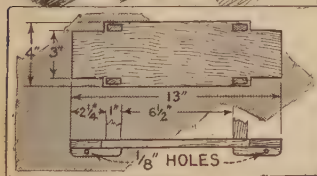
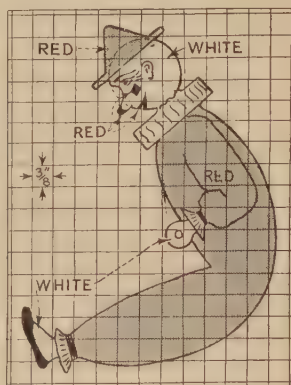


BY HERBERT C. MCKAY

A TOY, that will be a delight to the youngsters, is the tumbling clown, shown in the illustration below. It consists essentially of a cart, the back wheels

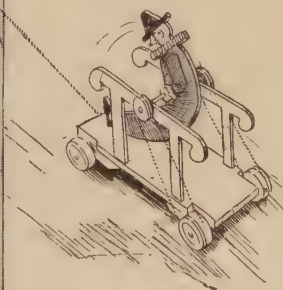
being a clown being mounted on the shaft. When the cart is pulled, the shaft is turned and the clown swings head over heels, apparently holding onto the shaft.

The clown body is cut from a piece of $\frac{1}{2}$ -in. wood according to the design given in the drawing, each division measuring $\frac{3}{8}$ in. square. When com-

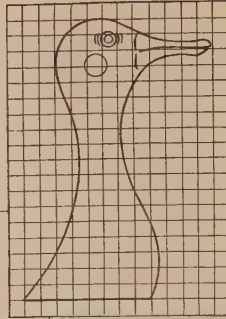
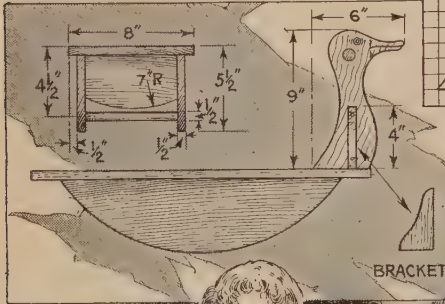


Tumbling Head over Heels As the Cart Is Pulled Along, the Clown Offers Constant Amusement to the Youngsters

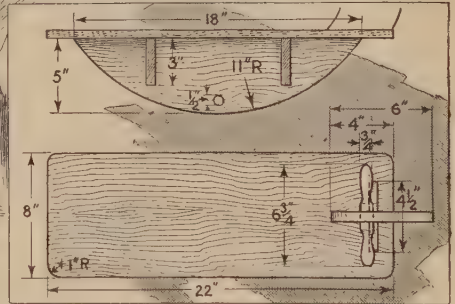
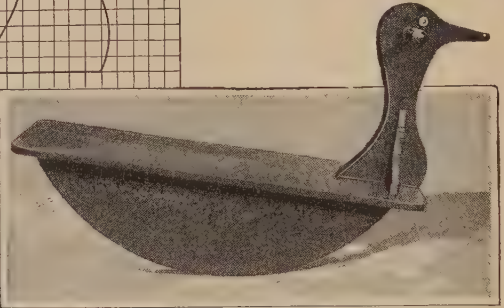
of which are belted to a shaft supported on the frame of the cart, a wooden figure resem-



pleted, the figure must be carefully balanced and the accuracy with which this is done determines the success of the toy. The whole action depends on the balancing, for there is not enough power to turn the clown if it is seriously out of



are attached securely, glue being used for this purpose. The side supports which serve as bearings should, of course, be reamed out so that the axles fit in them loosely. The clown is similarly



A Rocking Duck Is a Strong Wooden Toy Which Can Readily Be Made by Anyone, and Is Convenient for Children to Mount

balance. The center of balance lies somewhere in the hands and the exact point can be determined by driving two small pins into the hands, directly opposite each other, and testing the balance by suspending the clown from a string looped over the pins.

The wheels may be cut from a wooden curtain pole, the exact diameter being of little importance as long as sufficient clearance is provided for the base and the axle boxes. The drivewheels are $\frac{3}{4}$ in. thick, while the front wheels are $\frac{1}{2}$ in. thick. A groove, about $\frac{1}{16}$ in. in width and depth, is cut in the former to hold the drive belt. The parts are enameled and, after it has become thoroughly dry, the toy is assembled. The wheels are drilled in the exact center to receive the axles on which they

glued to the shaft. The grooved wheels must be in line and rubber bands are used for belts.

Rocking toys will always be popular with small children, but the trouble with most toys of this kind is that the small child finds it hard to get in or out of them unaided. The rocking duck, shown in one of the illustrations, is not subject to this drawback. It consists of a seat, rocker, duck-head handle and the necessary braces. All the pieces, except the handle and one cross brace, are cut from $\frac{3}{8}$ or $\frac{1}{2}$ -in. plywood. The seat measures 8 by 22 in., and the corners are rounded. The two rockers are 18 in. long, have a maximum width of 5 in., and are cut on a 11-in. radius. The seat is fastened to the rockers by nailing and gluing, and two braces, of the shape shown, are provided between the rockers. All parts are then

screwed together securely. A $\frac{1}{2}$ -in. round or square rod forms an additional brace at the bottom, as indicated. The duck's head is cut according to the pattern, each square being $\frac{3}{8}$ in. in size. A handle is provided on the head as shown. This consists of a $6\frac{3}{4}$ -in. length of $\frac{3}{4}$ -in. wood driven through a hole in the head. The latter is securely fastened to the seat with three wood screws, and two braces are used to support it, one on each side of the head. The head may be painted white or yellow, the bill yellow and the features outlined in black. All the screw heads in the body are sunk below the surface, and the holes filled with putty. The surface of the wood is sanded and given a coat of flat white paint. After this has dried thoroughly, a coat of enamel may be applied, if desired.

Winter Feeder for Birds

When the ground is covered with snow, birds often find it difficult to get food enough to sustain life. They eat suet and chunks of fat meat, and the feeder shown in the drawing is designed to hold this kind of food so that the birds can get at it at any time. It consists of a wide board nailed to a post in the vicinity where the birds congregate. A shelf should be built below it, upon which the birds can sit and eat the chips of fat, while other birds may cling to the poultry wire, which is nailed over the fat or suet on the vertical board.

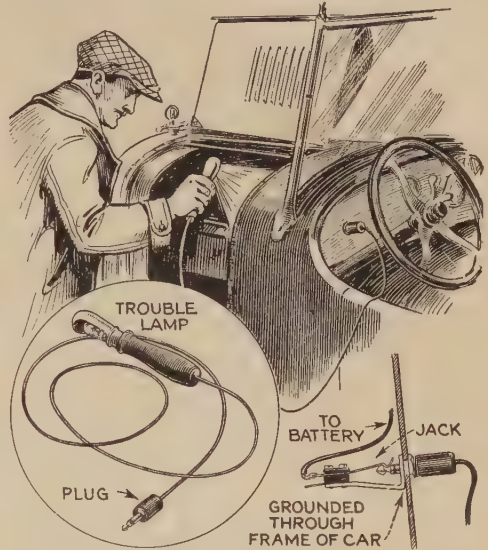


Use large-mesh wire and fasten it by means of flat-head nails, around which are wound all the loose ends of the wire, to prevent these from injuring the birds while perched on the feeder. The poultry wire holds the suet in place and protects it

from stray cats and dogs. Raise the feeder as high as possible from the ground.

Plug and Jack for Auto Trouble Lamp

A plug and jack, such as used in radio sets for phones and loud speakers, can be installed in the car for use with a trouble



Radio-Plug and Jack Installation on Auto Makes Handy Trouble-Lamp Arrangement

lamp. A jack of the single-circuit type is obtained and is installed on the dashboard, or any other handy place on the car. Two or three jacks can be mounted at other points. A small hole is drilled and the jack is fastened with the large nut. This nut serves as one connection to the battery through the metal parts of the car. The other connection is made with a single wire to the battery. A phone plug is connected to the trouble lamp with an extension cord. Pushing the plug into the jack immediately lights up the lamp. When finished using it, pull out the plug. —Herman R. Wallin, Brooklyn, N. Y.

Steel Wool as Furnace Repair

It sometimes happens that a poker or shovel is pushed through the lower casting around the ash pit in a hot-air furnace, making a hole that causes excessive draft. A satisfactory repair may be made by pushing some steel wool, soaked with iron cement, firmly into the hole, and smoothing over with the same cement. Stove lining may also be used, but it is not so permanent.—R. C. Tarr, Gloucester, Mass.



Masked Costume Made from Cardboard Boxes of Various Shapes and Sizes

Novel Costume Made from Corrugated Fiberboard Boxes

Corrugated fiber boxes of various sizes and shapes make up the disguise shown in the photo, a costume which recently won first prize at a masked party. The legs are sections of a box originally used to ship the handle of a vacuum cleaner. Two corners of each of these sections are slit so that one side forms a flap to cover the fore part of the shoes. The arms are made from the same kind of box, with three sides cut through at the elbow to form a flexible joint, so that the arm can be bent. A large box forms the main portion of the costume, covering the body. All four flaps at the bottom are opened to give the appearance of a skirt. At the top, two of the flaps are opened outward at the sides to form epaulets. The other two flaps are sealed down and a hole cut through, large enough to admit the head of the wearer. Holes are also cut in the sides to admit the arms.

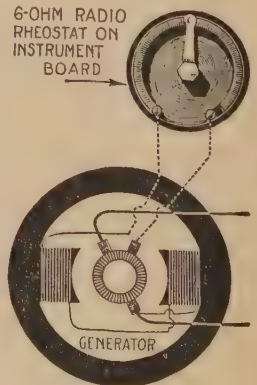
The box for the head is completely sealed, and then a hole is cut through at the bottom. This box is not fastened to the other but merely rests on it. Excelsior sewed to the upper box makes highly appropriate whiskers. The whole thing is quickly made and offers a complete disguise.—Leon I. Thomas, Oak Park, Ill.

Lock for Dial on Telephone

In an office where the dial telephone was located so that anyone in the office could make private calls at the company's expense, in many cases long-distance calls, it was found necessary to devise some method of preventing unauthorized use of the telephone. An ordinary small padlock was used to lock the dial, and this effectively prevented anyone from calling out, although it did not keep employes from answering an incoming call. It was estimated that the lock saved the office at least \$50 per month.

Rheostat Controls Auto Charging Rate

I mounted a 6-ohm radio rheostat on the instrument board of my car, and ran wires to the generator, placing the rheostat in series with the third brush—the one that controls the strength of the field flux—thereby regulating the rate of charge. Then, I moved the control brush up to a fairly high rate of charge with the resistance of the rheostat all out. By cutting the resistance in, a very nice adjustment is possible. This eliminates the need of burning the lights to prevent overcharging the battery on long trips, and makes it possible to lower the rate when driving at high speeds, and to raise it when driving at night. Also, by turning the rheostat off, the field is open and no charge is given, which takes a certain load off the engine and does the generator no harm.—Harold I. Calkins, Lomita, Calif.



How to Make and Keep a Good Lawn

By THE GARDENER

TO most amateur gardeners, fall would seem an unusual time to be thinking about making a lawn, but, as a matter of fact, this is by far the best time to do it. According to Prof. Ralph Curtis, of Cornell, "the best time to seed a lawn in the north is the last of August or the first of September When northern turf grasses, like Kentucky blue grass, redbtop, red and Chewing's fescue and the bent grasses are sown in the fall, the seedlings soon produce new shoots from the short, crowded joints at the base of each stem. As the weather grows cool and the days short, these stems do not elongate as they would in the summer, when the grass goes to seed, but they continue to produce an abundance of new shoots from the base. This is called 'stooling,' and it is this stooling habit that makes these grasses good turf-forming grasses.

"When these same grasses are sown in spring, the warmer weather and longer days stimulate the stem into long growth, instead of stooling, and this, under ordinary meadow conditions, will result in a good growth of hay. If the hay is not cut, the grass will go to seed. Of course, the lawn mower prevents seed production, but, even so, the spring seedling will tend to spindle rather than to stool, and will not

produce such vigorous turf as the fall seedling. The spring seedlings are also much less able to hold their own against hot weather and crab grass and other summer weeds. For all these reasons, a good seeding made in late August or early September will give northern grasses a flying start which the weeds can never overcome, provided you keep the grass growing vigorously and normally thereafter."

A good lawn, like a good house, must begin with a good foundation, and it is here that most new lawns fail, especially around new houses. The contractor, when grading around the house, seldom has the lawn very much in mind, and the consequence is that debris of all kinds, bricks, slabs of concrete, timbers, plaster and sticks of all sizes are found an inch or two below the surface, barely covered by the stiff clay excavated from the foundation and with the surface disguised by a bare inch of black soil. Grass will not grow over such stuff, so the first thing the lawn maker should do, around his new house, is to spade up the ground to a depth of at least 2 ft., so as to expose and get rid of the debris. If there is any stiff clay in the grading, spade in a few loads of sand so as to lighten it, for grass will not grow



Thorough Preparation of the Soil and Ample Seeding Are Essential in the Making of a Lawn, Especially a New One, and Too Much Care Cannot Be Spent on This

on top of clay. Good drainage is one of the most important features of a good lawn, and a stiff clay subsoil does not permit drainage, consequently the grass, if it

as if it had suffered from an attack of whatever it is that causes baldness, for the annual grasses have not come back and only a few little knots of the perennial grasses grace the lawn.



A Picture of the Usual Conditions around the New House; Grass Will Not Grow on Top of Stuff Like This

does get started, gets "wet feet" and dies. In the absence of sand, even coal ashes, well spaded in, will lighten the soil enough to enable drainage to be established. When the ground has been thoroughly spaded and the lumps well broken up, rake the surface fine, level it off and prepare to sow the seed.

To many people grass is grass, and they do not know that there are many different varieties, each with its own preference as to location and soil. To get a good lawn all around the house, it is usually necessary to use a shade grass on the north side, under heavily leaved trees, etc. The first requisite is good seed. Go to a reliable seedsman and pay the very highest price you can afford for seed. Many of the cheaper brands, sold by other than seedsmen, contain large proportions of seeds of annual grasses, and, although these start quickly and make the lawn look fine the first few weeks, the next season it will look

The amateur should know something of the peculiarities of the various lawn grasses, and a few of these are as follows: Kentucky blue grass is generally recognized as the best all-around lawn grass, but it does not make a good lawn the first year, and it turns brown in midsummer; it grows in all soils, but the soil must not be sour. Redtop also will grow in any soil and is good mixed with Kentucky blue grass. Creeping bent grass makes a splendid, close, velvety turf that will stand hard wear; its roots are creeping, as its name suggests. It is good in gravelly, light and moist soils, and will stand poor drainage. Chewing's fescue is another creeping grass that is good beneath trees and in other shady places; it will stand an acid soil. Fine-leaf sheep's fescue is a fine-leaved grass that is also good for shade, and in any dry soil. Rough-stalked meadow grass is the best for shade, and, as its color is very close to

that of Kentucky blue, it is suitable for a lawn where the blue grass is used on the more open spaces. There are many other varieties, but the foregoing are among the most common of good lawn-seed mixtures.

Having obtained good seed, spread it on the prepared ground at the rate of 1 lb. to each 250 or 300 sq. ft. It is best to sow a strip about 10 ft. wide, rake it in one direction and then at right angles to this in order to get the seed well covered, then roll the strip down and proceed with another strip. Do not roll the ground too hard, or you may find that the grass will not come up. On the other hand, the ground should not be left so soft that every dog track on it shows up like a sore thumb. Roll it enough to get the seed into intimate contact with the soil particles. After seeding, raking and rolling, wet the seed down with the hose, using a fine spray so as to avoid washing out the seed, and wet it

down thoroughly every evening or early every morning, until the grass has got a good start. If you like white clover in your lawn, use $\frac{1}{2}$ lb. of clover seed to 1 lb. of grass seed, and sow the clover seed separately, as it is much heavier.

The grass should not be cut until it is about 4 in. high, and the lawn mower should be adjusted so that it does not cut too close for the first few mowings. Most people either rake the lawn clippings off, or else use a grass catcher on the mower. Don't do this; let the clippings lie. Some may object to the appearance of the clippings on the lawn, but this is not a very weighty matter, as they disappear in a day or two, and the advantages of letting them lie far outweigh this slight disadvantage. In the first place, the clippings form a light mulch over the lawn, protecting and shading the roots of the grass from the sun; in the second place, as the clippings decompose, they return to the soil some of the food elements that went into their growth, and thus they actually serve as a very light coat of manure all the year around. If the lawn is cut once or twice a week, the clippings are never heavy enough to be objectionable, and, as mentioned before, they disappear into the grass very quickly.

Rolling is a part of the care of the lawn that is seldom given the attention it deserves. It is said that a visitor, admiring the smooth, velvety lawn on an English estate, once asked the gardener what the

secret of producing such a lawn was. "Well," said the gardener, "there's no secret as I know of, although it do take a bit o' patience, as you might say. You sows your grass, and then waters it, an' cuts it an' rolls it for two or three 'undred years, an' then you 'as a lawn."

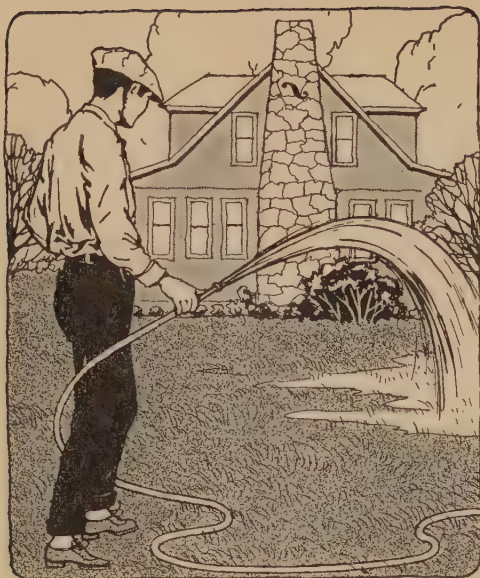
We do not need to wait "two or three 'undred years" for a good lawn, but we do need to water it and cut it and roll it. Especially in the spring, after the frosts have been heaving the ground all winter, does the lawn need rolling, to compact the soil about the roots of the grass. Once or twice a month during the summer, the roller should be brought into action, preferably after a shower. In England, many of the lawn mowers are fitted with heavy rollers, so that the lawn is rolled every time it is mowed. As a matter of fact, one can hardly overdo the rolling.

Watering is another thing that is usually done wrong. Don't "sprinkle" your lawn; soak it. When the ground is merely sprinkled, the surface soil only is moistened, and the grass roots occupy this shallow layer. By thoroughly soaking the lawn, the roots are encouraged to go deeper, and are thus better able to stand the hot days of summer.

And now we come to the matter of lawn food. We cannot go on year after year growing grass in one spot and taking the food elements out of the soil without replacing them. Allowing the grass clippings to lie and decompose does return



Rolling Is a Much-Neglected Part of Lawn Care, But One That Is as Necessary as Mowing, Especially in the Spring After the Winter Frosts Have Heaved the Ground



When You Water Your Lawn, Don't "Sprinkle" It Lightly; Soak It Thoroughly

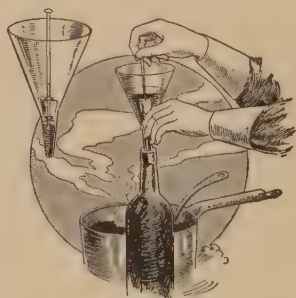
some food elements to the soil, but more must be supplied. Many amateurs conscientiously spread lime over their lawns spring after spring and imagine that this is all the grass needs. This is not so; lime is not a fertilizer and very few lawns really need it. If the soil is sour, lime will help to sweeten it, and lime plays a part in unlocking the food stored up in the soil and in making this food available to plants, but the grass needs a complete fertilizer. In addition to this, lime encourages the weeds. Bonemeal is an excellent fertilizer for lawns, as it is a source of potash, which makes for good, stiff growth. It is also a safe fertilizer, for it will not "burn" the grass, even if used excessively, and the excess will simply lie until it is used up. Enough should be spread over the lawn to whiten it. Nitrate of soda is useful in giving the grass a quick start in the spring, but it should be used as a solution not stronger than 1 oz. to 2 gal. of water, sprinkled over the lawn, then washed in with the hose. Sulphate of ammonia is a good fertilizer for the bent grasses, and, as it tends to create an acid soil, it discourages the growth of weeds. It is not especially good for Kentucky blue grass, which prefers a soil not markedly acid. Most seedsmen carry a non-odorless, special lawn fertilizer which contains the

proper proportions of nitrogen, ammonia and potash for the grasses, and the use of one of these is strongly recommended. Some care is necessary in using them, to prevent burning, but the amateur will have no trouble in this respect if he follows the directions accompanying the fertilizer. Hardwood ashes are also good for lawns.

Now as to weeds. There is no easy way to get rid of weeds, but their greatest enemy is a close, vigorous turf, where the seeds can find no lodgment. Sulphate of iron sprayed over the lawn, in solution, will kill dandelions without injuring the grass, but, in the hands of an amateur, this method is a trifle dangerous, so the best advice is, dig 'em out, then fill in the hole with a mixture of good soil and grass seed, press this down firmly, and the new, close grass will keep out the weed seeds. Be sure you get all the roots of the weed, as cutting it off just below the surface only causes two to appear where one grew before. If a lawn is very badly infested with weeds, it will prove simpler, in the end, to plow it up and make a new lawn.

Bottling Beverages

Everyone who has bottled beverages of any kind has experienced the waste caused by having too much in the funnel when the bottle is nearly full, with the result that the surplus liquid runs over. To prevent this, the stopper shown in the illustration will be found convenient. Get a cork to fit into the spout snugly and run a 4-in. stove bolt through it, washers and nuts being used to keep the cork in place tightly. When a bottle is full the cork is pressed down and the funnel can be transferred to another bottle without spilling the liquid.—L. J. Flugel, Chicago, Ill.



☐ A simple and handy pincushion can be made of a large cork fastened to any support or base with a nail or screw.



The Tricks of Camping Out

By EARLE W. GAGE

FOR summer camping or hiking, elaborate clothing supply is an incumbrance. For a short trip, special clothing is unnecessary. Old things will do. If outing clothes are bought, they should be of rain-shedding duck, khaki or forestry cloth. Better travel in lightweight things, with extra garments to put on when resting. A sweater is invaluable and may take the place of a coat if something waterproof is provided against rain. This may be an army poncho or a waterproof silk cape, about 4 by 7 ft. in size, with a slash in the

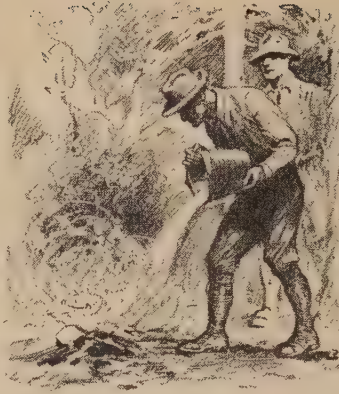
and high boots, but bloomers and short skirts will do; an outing shirt is better than a middy blouse, and woolen shirts are better than cotton, except in very hot weather. Underwear should usually be medium-weight cotton or lightweight wool. Felt hats give best all-round service.



center for the head, also serving as bedding. A cruisers' shirt of closely woven woolen goods serves as both coat and waterproof. Men should wear leggings or high boots. Women usually wear knickers

Buckskin gloves, without cutts, are good for working around camp and to keep off mosquitoes, but hop pickers' canvas gloves will do. It is also a good idea to take along a yard or two of mosquito netting, especially in the mountains or for sites near low water.

Footwear is most important of all. Comfortable shoes and wool socks are absolutely essential. The uppers of the shoes need not be of the heaviest weight but the soles should be thick, as they keep the feet from tiring and hold hobnails, important because soles become slippery on forest trails. New shoes should be broken in before starting, for blisters are dangerous as well as painful. Avoid narrow heels. If your ankles turn in or out, running your shoes over, buy side plates that screw to the heels and stiffen the counters. Instep and ankle straps, buckled outside the shoes, are excellent in steep country to prevent jamming the toes and blistering the heels. Always have insteps tightly laced. If, after all, heels slip and blister,



ram with a stick as much cotton or moss as you can force in between the ankle and heel on both sides. This prevents slipping. Moccasins will be found restful after a hard day's hike.

Trunks, suitcases, grips and satchels should never be taken on extended camping trips; the rough usage incident to camping will soon ruin them. Aside from this fact, they are very inconvenient to

handle, especially if pack horses are to be used for transportation.

Extra clothing and other personal equipment are best carried in a heavy canvas bag, known as a "duffle" bag, which can be purchased from any firm handling sporting goods. Such a bag is fitted with a canvas loop or handle at one end and another at the side; the top has an inside hood, which should be waterproof, and the bag is shut with a drawstring or bar lock which is passed through eyelets at the open end.

A tarpaulin is used as a protection for the bedding when the latter is rolled into





a pack or made up down on the ground. The best size is 11 by 15 ft., or the same size as a regulation wagon sheet or cover. It should be of not less than 8-oz. duck, and should weigh approximately 10 lb. No waterproof blanket need be included in the bedding if a good grade of tarpaulin is used. A 30-ft. length of $\frac{1}{2}$ -in. manila rope is used to tie the bed for packing.

Amateurs cannot handle or care for pack animals and should never attempt a trip on which they are to be used without employing an expert packer as well as a complete outfit. Auto equipment may be had on any scale up to running-board kitchens and trailers, special beds and tents. Gasoline or kerosene stoves are labor-saving and practical except for heavy cooking and baking, obviating wood rustling and trouble with fire wardens. The prime requisite of all auto equipment in connection with the food supply is that it be dust-proof. All covers should overlap and close down on felt straps. Plenty of canvas covering is also a good thing to use.

For back packing in the woods, there are four standard devices, their relative



superiority being much a matter of personal opinion. The canvas pack sack with straps is simple, easy to load and can be bought in any size or quality. Its chief defect is that it is rather inadjustable to the shape and weight of the load, which likely will rest too low on the back. Packs should always ride high. The pack board is a flat wooden frame with shoulder straps. The load is lashed to it or suspended in a sack into which the frame is built. A variation of this form is one made of hollow



tubing to provide ventilation, and is bent so that cross webbing bands rest against the body. One of the most common and best devices, if employed with some skill, is the old-timer's bedroll. The blanket is folded lengthwise, until it is about 2 ft. wide, with the edges lapping over the food and small articles, which are first laid compactly in the center and near one end. The roll is begun at this end to form a cylindrical bundle, with all the hard articles in the center. Straps or cords around each end hold it firmly, and to these the shoulder straps are attached, together at the top and separated a foot or more at the bottom, to prevent swaying. Sometimes the roll is put in a sack before strapping.

Gunnysacks and overalls furnish a variation of the above system and this equipment is preferred by many. The leg bot-

toms of a pair of old soft overalls are tied to the bottom corners of a gunnysack with a chip or pebble in each corner so that the string will not slip off. The load is placed in the sack, the top of which is gathered down as close to the load as possible and there lashed with a string to the overalls, which are gathered exactly at the crotch. The legs form the shoulder straps, and the waist is spread back over the pack to shed rain.

Always use some method of suspending even a light pack from both shoulders. Anything on one shoulder, even a long slender blanket roll, is very tiresome. See that the shoulder straps are not too wide, narrow, tight, loose or hard. Keep the pack as high as possible without binding the

arms or the chest, or it will tip back and hit the small of the back, and also tire you by swaying.

Next to the badly slung pack the commonest errors are too much load and too much speed. Avoid non-essentials and duplicate articles in the party. Anything above 25 or 40 lb. is too much to carry conveniently. A four-day trip can be made comfortably with less than 30 lb. Always travel slowly and rest often.

The most important thing to consider when choosing a camp site is the supply of water. This is absolutely essential except at temporary camps, where water is provided in barrels or canteens. When a camp is to be more or less permanent, it should be located at a point far enough away from the source of water supply to prevent its contamination from camp refuse, if this is allowed to accumulate. Refuse should always be burned or buried, as it attracts flies and other insects.

Fuel is the next important item to consider. Ordinarily, where camps are established in wooded regions, there will be found sufficient dead wood for all heating or cooking purposes. But if no wood is available and a camp is to be made in the open country, dry stock manure will prove

an excellent substitute. This is the fuel the old-time pioneers used when crossing the prairies, where they sometimes saw no trees for months.

The accessibility of the camp must also be taken into consideration. If equipment and supplies are to be transported by means of wagons, it is especially desirable to have the camp located at a point which wagons may reach without difficulty and where there is plenty of room for backing or turning them about. The camp may, however, be located in a much rougher place, if pack animals are to be used to carry the equipment and supplies. In either event, it should be so located that it will provide easy access.

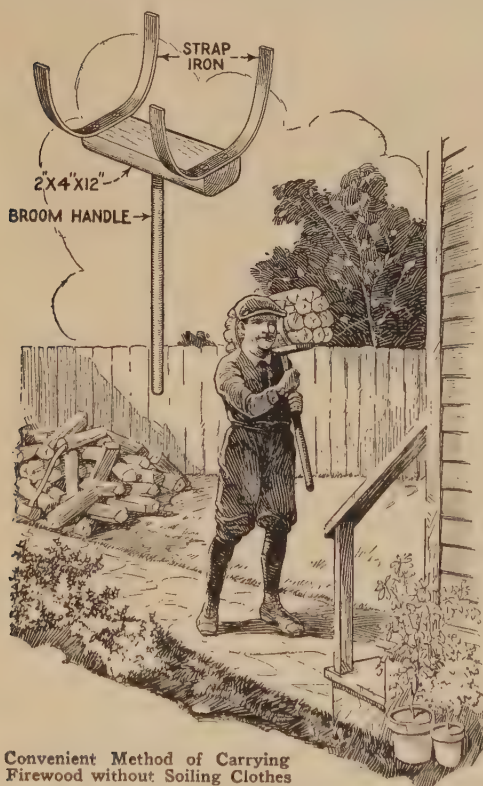
After the questions of water, fuel and accessibility have been satisfactorily settled, the one



of protection should be considered. Winter camps located on northern slopes, which have little sunshine or are covered with heavy timber, are usually dreary and uncomfortable. On the other hand, summer camps located on bare, exposed south slopes are also uncomfortable. When camps must be established in country where stock grazes at large, it is always advisable to construct some sort of fence around the tents.

Carrier for Firewood

When wood has to be carried into the house from a wood pile in the yard, the



Convenient Method of Carrying Firewood without Soiling Clothes

task is rather unpleasant, especially during rainy weather. The provision of a carrier of the kind shown in the drawing will be found to lighten the work considerably and it will also protect the clothes to some extent. The handle consists of a 30-in. length of old curtain pole or broomstick. The crossbar is a piece of 2 by 4-in. wood. Barrel hoops can be used for

the side bars, but 34-in. lengths of strap iron, bent as shown, will be more satisfactory. Two holes are drilled in the middle so that the side bars can be securely screwed to the cross member.

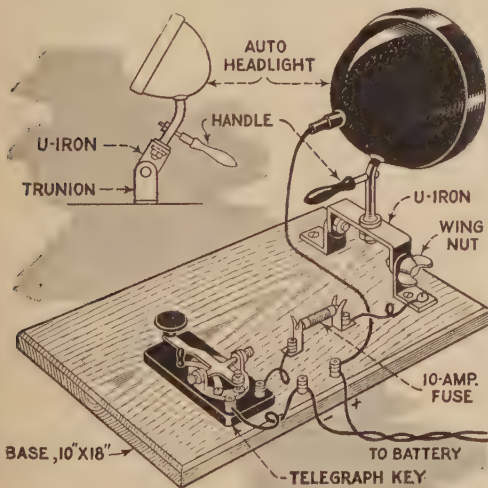
Casein Glue

Casein glues are splendid for woodworking, for making cardboard articles, and when the composition is varied somewhat, make excellent cements for china and metals. To make the glue, soak a quantity of casein powder two hours in an equal weight of hot water. To this gummy mass add one-seventh the weight of the casein in borax, which has been dissolved in very little hot water. Stir until all is dissolved after mixing borax and casein. This can be thinned with water to suit and is a good glue, but it can be made more adhesive by the addition of a little sodium arsenate. Any alkali, such as soda or ammonia, can be substituted for the borax. To make a china cement, lime or water glass should be substituted for the borax. Addition of burnt magnesia increases the speed of hardening.

Electric-Light Telegraph

While radio is the modern means of code transmission, even the simplest sending set is costly and needs a special license to operate it. For the boy who wishes an efficient and inexpensive telegraph system, one can be built that will transmit messages over a considerable distance. Government experiments have shown that a common auto headlight will transmit readable signals for over 150 miles, so, with two outfits similar to the one shown in the illustration, signals can be sent and read by two operators miles apart, as for instance across a wide harbor or lake, or between two hilltops. Such transmission must necessarily be done at night, and, by employing lenses that will shoot a narrow beam, messages can be confined to a fairly straight line and not be noticeable out of the line of the light. A 32-cp. bulb and a storage battery can be used. The outfit is constructed as follows: Make a heavy wooden base, at least 18 in. long and 10 in. wide. Near the right end, fasten a common telegraph key. Some space

should be left to the right and in front of the key for the operator's hand. Then, at the left and about 3 in. from the end, mount two metal trunnions as indicated. These are merely angle irons with a pivot hole in the center of the uprights. They can be made from any fairly stiff metal. Place them 4 in. apart and between them pivot a wide U-shaped piece with a hole in the center of the horizontal side into which the threaded end of the headlight shank is fitted. Two washers and a nut serve to hold it in place but allow sufficient play so that it can be turned if desired. The U-iron can also be swung forward or backward, and is locked by a wingnut on one of the pivot bolts. Drill the light shank as suggested, and insert a handle for turning the light. Place two binding posts on the baseboard and wire one to the key. The other key terminal is wired to a 10-amp. auto-light fuse in a spring-clip holder fastened to the baseboard, and the other end of the fuse is then wired to the trunnion. The other binding post is wired direct to the bulb socket in the light. Mount the whole affair suitably near a window or outdoors on a tripod. Connect the battery to the binding posts and you are ready to send. Pressing the key for a short or a long time makes dots or dashes of light. Direct the light toward the desired point, lock it in place, and the beam will travel straight to your correspondent at the receiving end



Using Auto Headlight and Telegraph Key to Flash Messages by Rays of Light

Dolly Aids in Landing Small Boats

Dragging rowboats or canoes along a dock or float is hard work, and is also in-



Handy V-Shaped Dolly with Roller-Skate Wheel for Moving Rowboats

jurious to the bottom of the boats. A dock tender at a yacht club overcame all this trouble by building a dolly for the purpose, as shown in the illustration. Two boards, 12 in. long and 6 in. wide, were beveled along one long edge and screwed together. A V-shaped block was fastened in one end and two pieces of flat iron were bolted to the sides, about 4 in. from the end block. The lower ends of these were drilled and fitted with an old skate roller. When a boat was to be moved it was lifted by the stern and the dolly slid in under the keel. The weight of the boat held it in place as the keel pinched down into the "V." It could then be easily wheeled in any direction.—L. B. Robbins, Harwich, Mass.

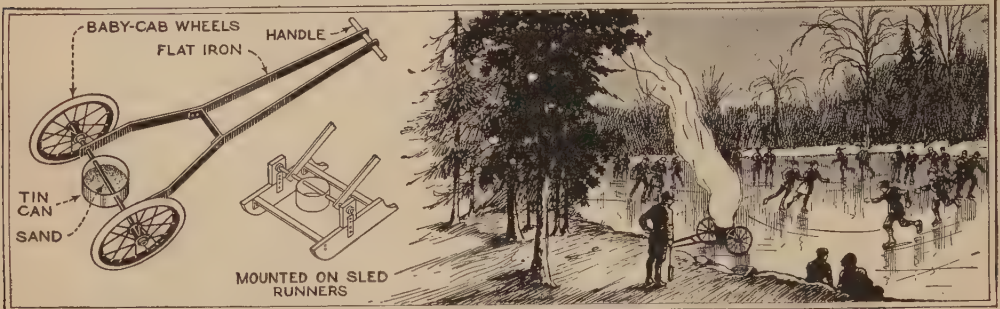
Outboard Motors as Baggage

According to the western association of general baggage agents, outboard motors, regardless of how they are packed, must be shipped by express, and cannot be checked as baggage.

Flaming Beacon for Night Skaters

This beacon will be found useful for skating or coasting parties, as it is easily moved about and will give light for a long

runners can be used instead of wheels. These can be made of light material, $1\frac{1}{2}$ in. thick, 4 or 5 in. wide and about 14 in. long. Drill holes for the ends of the axle 1 in. from the top and 2 in. ahead of the



You Can Have Much More Enjoyment from Skating or Coasting at Night, If You Provide Yourself with a Flaming Beacon to Give Light

time. When set on top of the coasting hill, it will cast its beams for miles. It consists of two wheels with a metal can mounted midway on the axle that supports them. The handle is fashioned from two lengths of flat iron with a rod or broom handle set through holes in the front end. If desired, only one length of flat iron of double length, bent sharply in the middle, can be used. Besides the rod, two wheels, such as can be salvaged from an old baby cab, are needed, together with the axle. Holes are punched through the side of the can just above the middle and the axle is run through them. After drilling the ends of the lengths of iron, fit them over the axle, drill the front end and insert the handle. If the holes at the rear end are a tight fit, the "pinch" on the handle at that point will hold it in place securely. Before starting out, fill the can with dry sand and pour over it some kerosene to which a small amount of gasoline has been added. When it is lighted, the beacon will burn for several hours. When facing the wind, draw the light behind you and, if the wind comes from behind, push the light in front of you. If desired,

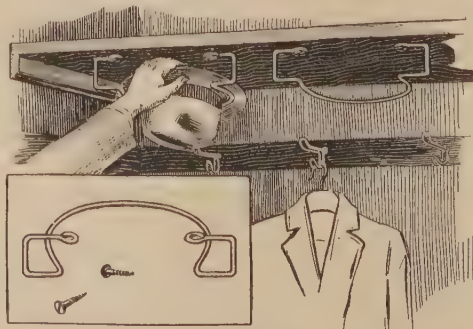
center, and the runners will ride rough spots with ease.—Dale R. Van Horn, Walton, Nebr.

Restoring Tone Quality of Violin

A novel method of quickly restoring the tone quality of a violin, which has become sluggish and impaired in this respect, due to long periods of disuse, consists in placing the instrument with its sound holes in close proximity to a radio loud speaker. It has been found that new violins can be "aged" in the same way.—Luke Mattera, Brooklyn, N. Y.

Hat Hangers for the Closet Shelf

In closets where the space is limited a simple device can be used to keep hats in place and entirely out of the way. It is made of No. 10 galvanized-iron wire,

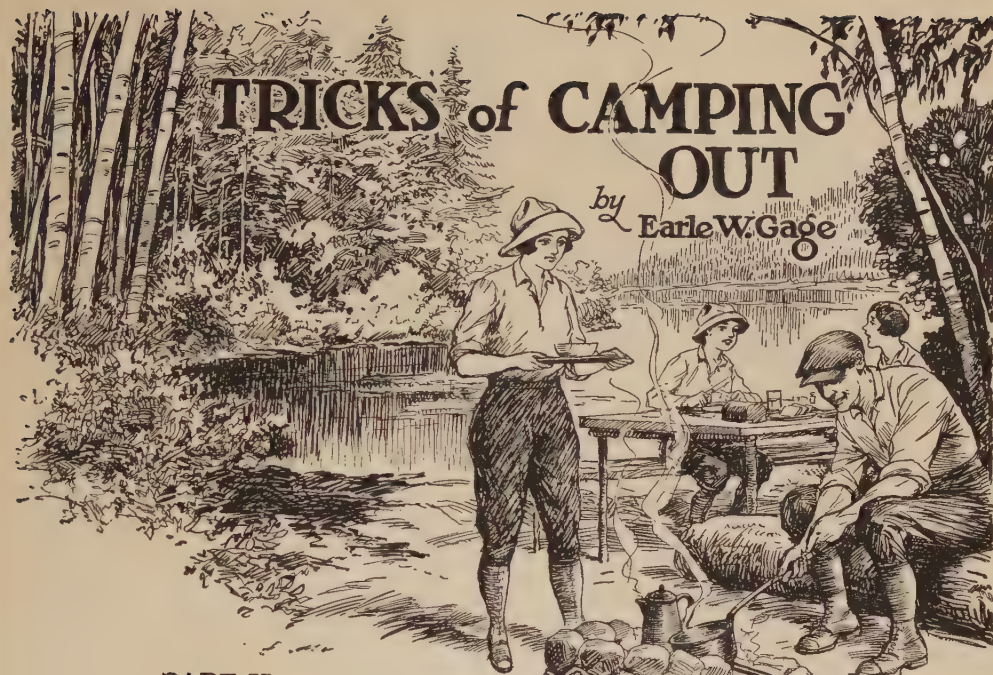


Easily Made Wire Hat Hangers Attached to the Under-side of a Closet Shelf

which is bent to the shape shown in the drawing, two "eyes" being provided at the ends, as indicated. The hanger is then fastened to the underside of a shelf with two wood screws through the eyes. A number of these hangers can be used in most closets.

TRICKS of CAMPING OUT

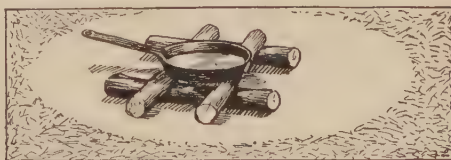
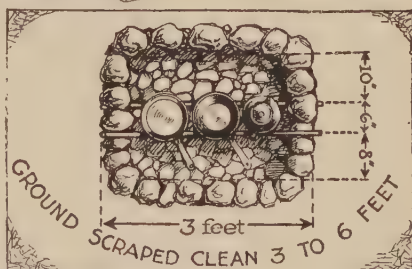
by Earle W. Gage

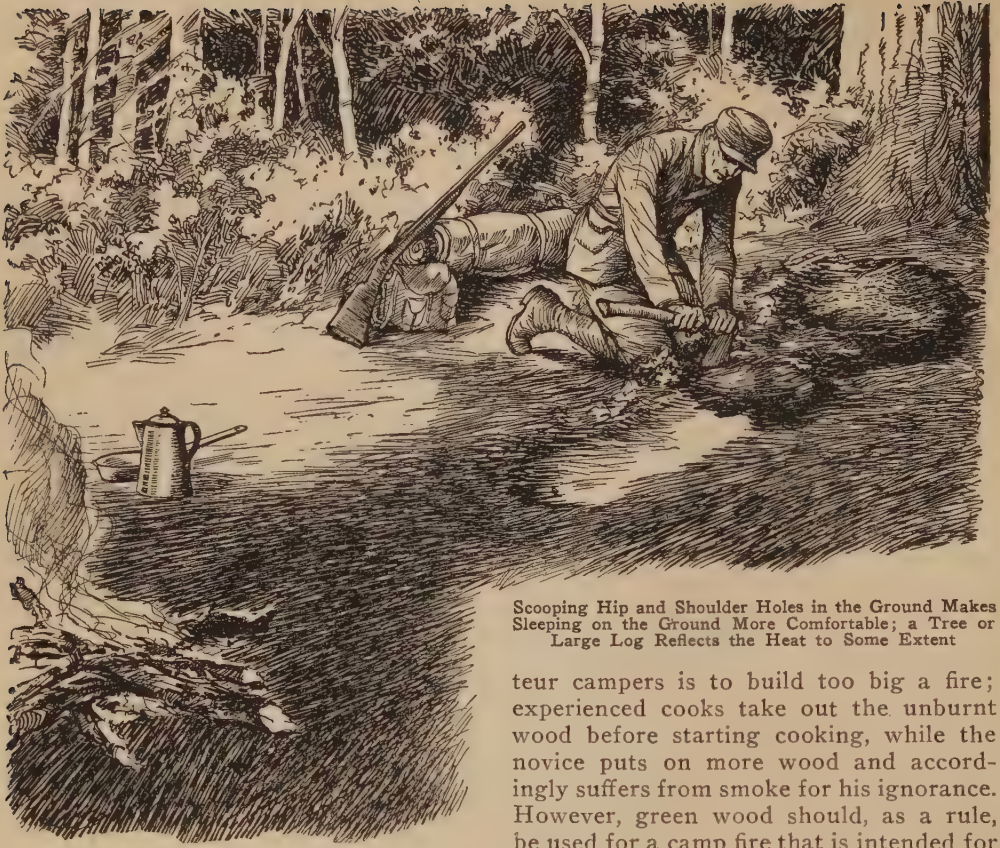


PART II

THE camp fire plays one of the biggest parts in the outing, as all the cooking and baking depend on it. It is best to take a camp stove whenever one can be transported, as it is safer to use than open fires, more convenient, requires less fuel, and does not blacken the cooking utensils so much. Collapsible sheet-iron stoves will be found useful for this purpose.

In the absence of a stove, however, an open hearth may be built. A safe and serviceable fireplace can be made of rocks placed in a small circle and a few iron rods to support the utensils, according to the accompanying illustrations. Where rocks are not obtainable, poles may be used. For permanent camps, it pays to build a stone fireplace over which is laid a piece of sheet iron; this will prevent the blackening of the pans and also give a better draft. For temporary camps, the fire should be built as follows: Excavate a hole, about 1 ft. deep and about 3 or 4 ft. in diameter. Shovel away the side toward the wind and lay green poles across the hole to support the pans and other utensils. Fire irons are often convenient. A 4-ft. length of $\frac{3}{8}$ -in. iron rod is bent at





Scooping Hip and Shoulder Holes in the Ground Makes Sleeping on the Ground More Comfortable; a Tree or Large Log Reflects the Heat to Some Extent

right angles, about 1 ft. from each end, and the ends are sharpened. Two of these irons, placed side by side, with the ends driven into the ground, and the fire kindled beneath them, make a good fireplace. Instead of being made of one piece, the pegs and crossbars may be connected by rings at the ends. These can then be folded and will be easier to pack. Another good way to prepare the camp fire is to select two short medium-thick green logs and level down one side with an ax. Set and brace these logs a few inches apart, so that they will form a support on which the bottom of the cooking utensils will rest safely. Scrape a little trench underneath and, with a few additional logs, form the wind guard on one side. The two logs which are to form the sides of this improved cooking range should be arranged so that they are about 6 in. apart at one end and about 2 ft. apart at the other end, at which the baker may be placed, facing the glowing coals. The common error of ama-

teur campers is to build too big a fire; experienced cooks take out the unburnt wood before starting cooking, while the novice puts on more wood and accordingly suffers from smoke for his ignorance. However, green wood should, as a rule, be used for a camp fire that is intended for all-night service.

The Indians made camp fires long before matches were invented and therefore campers who are caught without matches can make use of the same primitive methods, of which a number are shown in the drawing on page 98. One of these uses a bow of stout oak or hickory, about 2 ft. long and strung with a loose leather thong. Make a drill of balsam, cottonwood, cedar or basswood, and of the same wood make a firestick, split flat with an ax. Notch this firestick with a penknife and start a small drill cup at the point of the notch. Make a pressure block for the upper end of the fire drill from a piece of hardwood, and you will have all the tools necessary for making fire.

You must also get some tinder ready, which will ignite easily. The best is birch or cedar bark. String it into fine shreds between two stones. To make a fire, pass the leather thong around the drill once, enough for the bow to run taut on it. Put

the drill point in the small cup-shaped depression at the end of the notch. Draw the bow back and forth steadily, with even strokes, its full length. You will grind out filings which are brown, but after two or three seconds you have a pile of black shredded wood dust, and presently smoke will come from the pile which forms on the top of a chip placed under the notch. A glowing coal will form in this as you blow on it gently; add some of the tinder and capsize the coal into it. Breathe gently on the flame.

Another method is to take a piece of bamboo, split it in half, and, after starting a notch, rub rapidly across with a sliver of bamboo. This forms a pile of dust from which will presently come smoke and a glowing coal, to which tinder is added and the flame started. Still another method is to knock the ball out of your rifle cartridge, take out all the powder, placing some in a pile of tinder, discharge the rifle or receiver into this, using only the primer and a few grains of powder strewn down the barrel. This is the easiest method of making fire in the woods, aside from the

use of matches. If there is sunlight, a magnifying lens or a watch crystal filled with water will serve to concentrate enough of the sun's rays to start a fire. Unless you have tinder, it is impossible to get a fire with flint or steel.

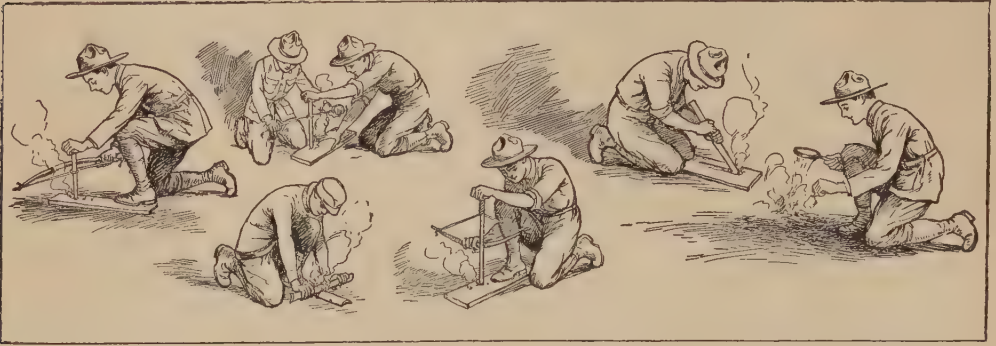
Good bedding is important because nothing takes more from endurance and enjoyment than loss of sleep. Where light weight is the object, nothing surpasses a sleeping bag. The best ones have an outer bag or canvas, tanalite or balloon silk, with two inner bags of eiderdown or other good blanket or quilting. According to the weather, the sleeper has more of the coverings over him to keep warm or beneath him for softness. Any blankets or quilts can be made into sleeping bags by folding them lengthwise and sewing or fastening the edges with horse-blanket safety pins. Of course, these are not water and wind-proof. Without a sleeping bag and without having bedding enough to improvise one, most warmth can be had by lying down and drawing the blankets over you as a coverlet; then lifting the legs without bending at the knees, and tucking the cov-



Proper Method of Tucking a Blanket under One's Legs for the Greatest Comfort When Sleeping in the Open; Always Sleep with Your Feet toward the Camp Fire

ering smoothly under them from both sides, folding the ends under the feet; lifting the hips and tucking the covering under similarly and finally following the same procedure at the shoulders, so that the edges are overlapped for the full length beneath you. Two light blankets are

scoop hip and shoulder holes. If the fire must be kept up all night for warmth or safety, have your head toward a log or tree to reflect the heat and stop the wind, for you should be windward of the fire to avoid smoke and sparks. The fire should be 5 or 6 ft. from your feet and in an open



Various Methods of Making Fire When No Matches Are Available; the Use of a Wooden Drill Rotated by a Bow Has Been Found Especially Satisfactory

warmer than one heavy one. Better than blankets are quilts of eiderdown or wool, with extra covering of denim or more weatherproof material. A 7 by 7-ft. sheet of 10-oz. canvas, folded, makes a good ground cloth and extra cover, while it is also useful as a pack cover when traveling or for a rain shelter.

Folding cots and pneumatic mattresses are practical for auto and pack-horse trips, although too heavy to carry when hiking. Brush beds are easily made from feathery coniferous boughs. Other boughs are useless. Use none that are larger at their butt than your thumb, and these only well covered by smaller tips. Collect a good supply first. If possible, confine the entire bed by 4 or 6-in. logs pegged in place, before the brush laying is begun, and with foot logs resting on the side logs. Lay the largest boughs in courses, "bow" up and overlapping, so that the butts are toward the foot end of the bed and, except at the very foot, covered by tops of other courses. Keep pushing in smaller boughs the same way; always lengthwise of the bed, bowed ends up, and butts down and covered by tops. Finally sift the smaller ones evenly over the whole. Try the bed and build up the weak spots.

If you have to sleep on the ground, choose a level place (so that you won't slide) and one that is free from roots; then

place, where you can walk around it and where no log, tree or rotten wood can catch fire from it. Before dark, drag up a good supply of the biggest logs and chunks you can find. Also locate more so that you can go out in the dark to get it if necessary. Sit up late, burning your smallest stuff. Save the biggest to keep the fire longest without replenishing during the night. Keep your shoes away from the fire even if they are wet.

While permissible on horse and auto trips, tents are inconvenient to carry when hiking. If taken at all, they should be small and of oiled silk. They are unnecessary unless it rains, and then shelter is provided by lighter ponchos, tarpaulins or like covers, elsewhere suggested as part of the bedding equipment and better adapted for this in good weather. They can be stretched, lean-to fashion, facing the fire and with the back to the wind.

Always provide drainage around the tents and shelter, especially on slopes, or the floor and the bedding may be flooded. Tent poles need not be taken in the woods. For an A-tent, have a rope long enough to serve as a ridgepole, knotted inside of each end grommet of the tent and having at least 10 ft. to spare at each end, to be tied around an improvised pole and then guyed to a ground peg. Often a tree serves for the end away from the fire.

Locking Ford Car Windows

The older Ford closed cars with the windows controlled by straps have no method of locking the windows. The doors can be locked by the use of locking handles but the window can be opened from the outside by prying the lower edge up from the iron strip on which it rests. A good lock for such windows can be made by drilling a $\frac{3}{16}$ -in. hole through the wood under the window frame, and into the space in which the windows are lowered. When leaving the car, large nails are inserted into the holes and the windows then cannot be dropped. The holes through the upholstery can be given a neat finish by using the parts of curtain fasteners that are clinched into the cloth of side curtains. The ball-headed screws are not used. These fasteners are attached to the cloth either by clinching them into it like an open-car side curtain, or by drilling two small holes, and using two fine wood screws.—E. T. Gunderson, Jr., Humboldt, Iowa.

Garment Hanger Keeps Moths Away

A good moth-proof garment hanger can easily be made from an ordinary wooden hanger by tacking a mothball receptacle on the underpart, as shown in the illustration. This will in no way interfere with the use of the hanger. A sheet of heavy



cardboard is cut to a disk, the size of which depends on the size of the hanger. It is bent at the bottom, and a 1-in. hole is cut in one side to insert the mothballs. A number of small holes

also are punched in the disk, so that the fumes of the balls will more easily penetrate the garment.

Spots on varnished surfaces often can be removed by rubbing them well with a soft rag saturated in boiled linseed oil.



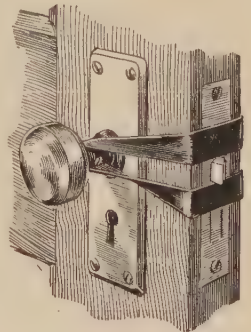
Barrel-Stave Sled Requiring Considerable Skill to Balance It

Barrel-Stave Sled

A barrel-stave sled that requires considerable skill to manage and provides great sport is made by attaching a seat well back of the center of the barrel stave as shown in the drawing. On such a sled there is naturally no method of controlling it other than by movements of the body or feet, but once the trick of managing it is mastered, it is controlled as easily as a bicycle when riding without steering.

Door Silencer for the Sick Room

Slamming doors are very annoying to sick persons. The trouble can readily be remedied in a simple manner by means of a heavy rubber band or a section, cut from an old inner tube, that is slipped over the door handles as shown in the drawing. This makes a good silencer and shock absorber, which will be highly appreciated by the patients.—Frank N. Coakley, Buffalo, N. Y.





You Can Make This PIRATE CHEST

By Edwin M. Love

WILLIAMSON

SHIP models on mantels and in wall niches suggest pirate chests as companion pieces—weathered treasure boxes strengthened by well-riveted straps and ornate hinges of iron. Such a chest, today, would cost the purchaser a sum almost rivaling the fortunes guarded by the strongboxes of old, and to make one would tax the ability of an expert. However, with linoleum for “iron,” upholsterers’ tacks for “rivets,” and a few carpenters’ tools, the home mechanic can build a chest in the most approved pirate manner, as a glance at the photographs shows. The materials required are listed at the end of this article. The linoleum may be scraps obtained from the nearest furniture dealer.

Since the corner straps hide the joints, poor joints

in the wood are concealed. The arched top, instead of being formed with well-joined strips, is simplified to four straight boards nailed on with spaces between, into which wedge-shaped strips are glued. It is difficult to get wide enough stock for the parts to be made of a single width, so it is necessary to glue up. From each of the two 10-in. and 8-in. boards cut two 4-ft. lengths and one 2-ft. piece. Group these in pairs of a wide and narrow board, marking crosses on the faces with a pencil to identify the mates and the face sides. The old tradition among workers is to alternate heart and sap sides to provide for warping in opposite directions, that is, toward the sap side, thus preserving a flatter surface, but modern methods of milling and seasoning

leave an open question as to whether the sap side contains more moisture than the heart. A good rule is to match the better surfaces.

The edges to be glued are jointed straight. They need not be square, provided the bevel on each matches the other, to make a



Jointing the Edges of the Stock for the Sides of the Pirate Chest

flat surface when one board is fitted on the other. Press first one end, as in Fig. 1, and then the other, looking at the far end to detect any opening that would indicate a high spot between. Then take out a "shrinkage shaving" from each, beginning and ending about 3 in. from the ends. The clamps will close the middle, and the extra compression of the ends will

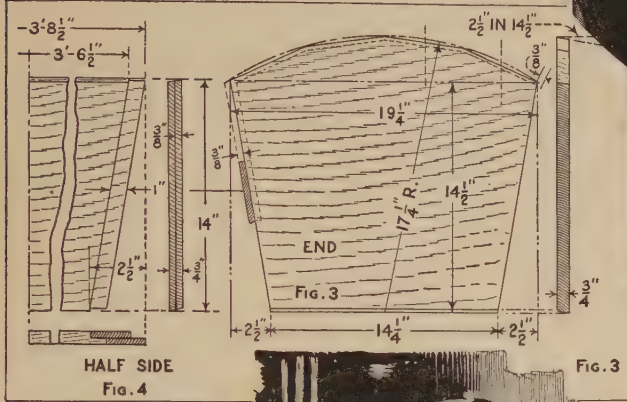


Fig. 3

compensate for rapid shrinking of the ends because of ready evaporation from the open pores. Fold the boards together with faces out, and square across both at the center and 6 in. from the ends,



Fig. 2, Squaring across the Ends; Figs. 5 and 6, Cutting the Rabbits on the Endpieces

as in Fig. 2. With a marking gauge set for $\frac{3}{8}$ in., and working from the faces, scratch through each line, centering the $\frac{3}{8}$ -in. dowel holes, which are bored to a depth of $1\frac{1}{4}$ in.

Cut the dowel pins $2\frac{3}{4}$ in. long. The extra length of the holes provides space for surplus glue, which otherwise either would prevent the joint from closing, or would split the boards. Apply glue to all joining surfaces, and clamp up. If using hot glue, warm the wood and work rapidly; but if liquid glue is used, allow it to soak into the wood for two or three minutes, and apply more where

none remains. Many poor joints with liquid glue result from so much glue sinking into the wood that none is left between the pieces to unite them. Two dowels are enough for the endpieces. The stock thus



Fig. 7, Marking
off Bottom; Fig.
8, Fitting Lining
in Ends



Fig. 9 Starting
Cut for Lid; Fig.
10, Detail of the
Corner Joint

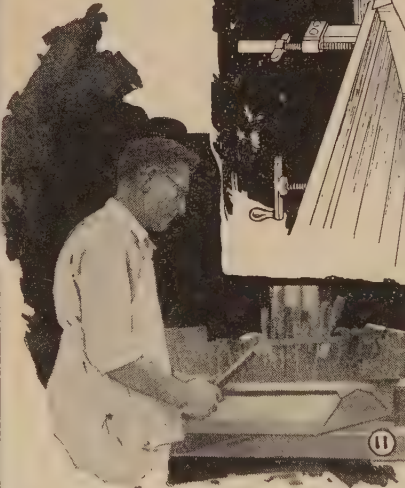
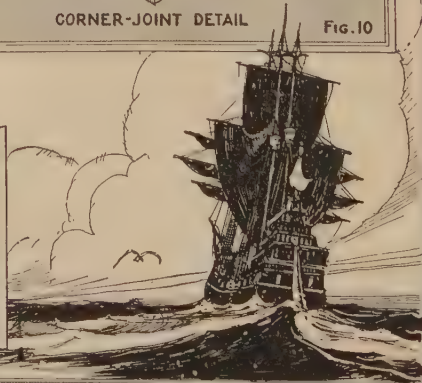
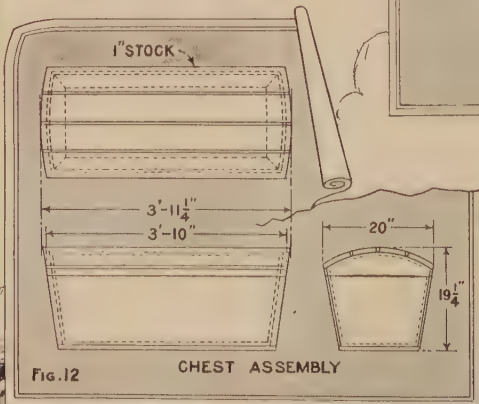
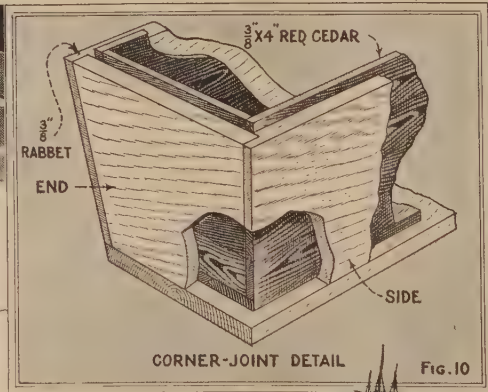


Fig. 11, Driving the Glued Strips between
the Boards Forming the Top of the Chest;
Fig. 12, Assembly



obtained is roughly 17 in. in width, so that narrow additional pieces must be glued to the lower edges of them to allow for the curve.

Fig. 3 illustrates an endpiece. Straighten one edge, square a line across the center of the outer face, and from a point $7\frac{1}{2}$ in. to the right, on the lower edge, to a point $15\frac{1}{2}$ in. above and $9\frac{5}{8}$ in. from the center, draw a line. In the same way lay out the other end. Set a bevel square to the obtuse angle indicated and bevel the lower edge to fit. With the base of the center line as a pivot and a radius of 1 ft. $5\frac{1}{4}$ in., describe an arc extending $\frac{3}{8}$ in. beyond each end line, and divide it into four equal parts, across which chords are drawn. Saw out the end, set the bevel for the acute angle, and, holding the handle parallel to the center line for tests, bevel the chords toward the inner face. Trace the other

width by comparison with the endpieces. On the inner face gauge lines 1 in. from the ends, and on the ends, $\frac{3}{8}$ in. from the outer faces. Saw the shoulders of the rabbets, guiding by a strip of wood tacked along the mark, as in Fig. 5. Remove the waste and trim to depth with a chisel, as shown in Fig. 6. Lay out the second piece from the first.

Tack the ends to the sides, and set them on the bottom. Square, and trace around the inside with a pencil, as in Fig. 7. Guiding on this line, nail on the cedar bottom lining, toenailing through the tongue every 6 or 8 in. with four-penny finish nails, sloped enough to prevent the points from coming through the bottom. Then scrape and sandpaper the lining.

Line the sides with cedar, cutting the ends flush with the rabbets. Start $\frac{3}{8}$ in. from the bottom with a strip of such width that the last board will be 2 in. from the upper edge. Again assemble temporarily with the ends, and nail the bottom to the sides, driving the nails at various angles to increase their grip. Then, piece by piece, fit the cedar strips in the ends, as shown in Fig. 8, bringing them to the height of the side linings. Remove the ends for smoothing, and brace the sides with strips. With a rip saw cut 6 in. into each side, guiding on a line parallel to the

bottom and located at a distance of 1 in. below the upper corners of the endpieces. (See Fig. 9.)

Nail the chest together with eight-penny finish

Fig. 13, Ripping Off the Lid; Fig. 14, Scratch-Brushing the Wood before Putting On the Linoleum "Ironwork"

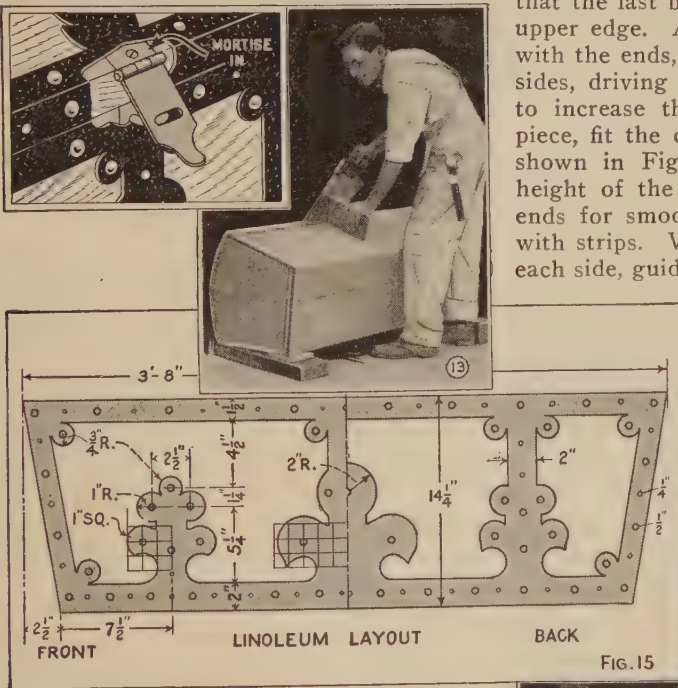
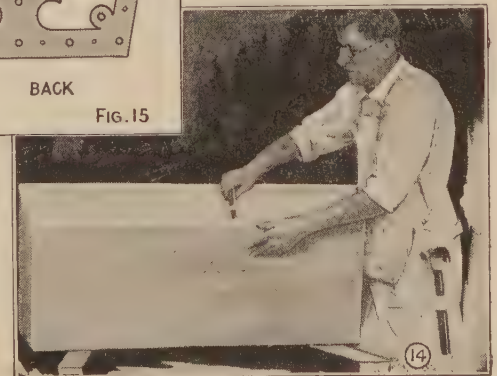


FIG. 15

end from the first. If the upper edges are not alike, when the lid is sawed off the box, the top boards will be sure to twist it out of shape.

The sidepieces are beveled on the lower edges and cut to a length of 3 ft. $8\frac{1}{2}$ in. on the upper edge, the ends, of course, sloping. (See Fig. 4.) Obtain the exact

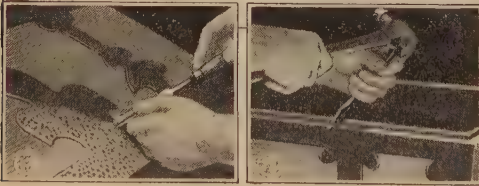
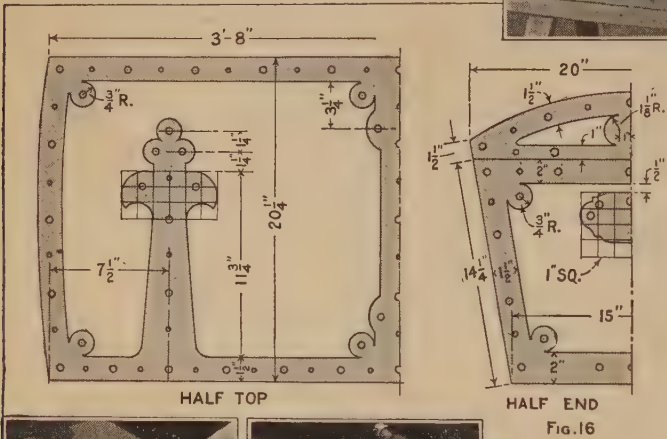


nails driven at various angles through both sides of the corners, while clamped together, forming the joint illustrated in Fig. 10. Bevel the upper edges of the sides, and nail on the four previously jointed pieces of 1 by 6 in. stock, that form the top, slanting the nails so that they will not interfere with the cutting off of the lid. Make three wedge-shaped strips, coat with glue and drive them into the cracks, as in Fig. 11. When dry, round off the surface to fit a cardboard template of a radius of 1 ft. 5¾ in. Trim the projecting ends of top and side, completing the assembly as indicated in Fig. 12.

Finish sawing off the top, using a guide



Fig. 17, "Peening" the Linoleum; Fig. 18, Mortising for the Hinges; Fig. 19, Staining the Finished Chest



block, if necessary, to insure the correct angle, as in Fig. 13. Joint the edges smooth, and mark the back edge. Line the top with cedar, gluing it as well as nailing.

With a wire brush, scrub the box lengthwise of the grain, as in Fig. 14, leaving a 1¼-in. border around the edges, until the soft wood is scratched out, leaving the hard grain in low relief. Mortise in the hasp and staple, as indicated above, Fig. 13, wedging the staple solid if it is of the loose type.

Lay a piece of plain inlaid linoleum over the lock side, tack it down, and trim the edges with a saw. Draw a border line 1½ in. from the edge at the top and ends, and 2 in.

at the bottom. In each corner scribe a circle of ¾-in. radius, the edge being ⅛ in. from the border, and joined to it with a curve. The lock-plate strap is 2½ in. wide, with 1½-in. circles in the upper corners. Centering on the strap, 6 in. from the lower border, draw arcs of 2-in. radius terminating in the strap edges, and draw the leaf forms below from a paper pattern developed from 1-in. squares, as shown in Fig. 15. The two side ornaments are based on straps 2½ in. wide, centered 7½ in. from the ends of the bottom, finished at the top by a circle of ¾-in. radius, centered 6½ in. above the low border, with curves of 1-in. radius 1¼ in. below, centered on the edges, and leaves drawn as for the center.

The back linoleum, when cut to size, can be laid out almost entirely by tracing from the front piece. The center strap, instead of reaching to the top, finishes with the 2-in. circle, while the hinge straps go to the top, as shown in Fig. 15. Trace the outlines on the box and paint on glue. Apply glue to the linoleum, and nail in place with ¾-in. brads driven every 1½ in., ¼ in. from the edges. Set them all in. The end and lid patterns are easily ob-

tained in the same way as the others, from Fig. 16. The ends lap past the sides, and the top past sides and ends. Place the handle plates $\frac{1}{2}$ in. below the upper strap of the box ends.

Surface the linoleum with a $\frac{1}{2}$ -in. gouge, as shown in Fig. 17, to imitate the hammer marks of the iron. Drive in the "rivets," centering on the straps and spacing them as evenly as possible. First drive the $\frac{1}{2}$ -in. tacks, and then the others. Put the lid in place, and, $1\frac{3}{4}$ in. from the center of each hinge strap, mark lid and box together at the joint with a knife

point. Remove the lid, take the hinges apart, and use one-half to mark the mortises. Make crosscuts with a chisel, Fig. 18, before trimming to depth.

Stain the wood fairly dark oak, applying with a brush, and wiping off the surplus with a cloth. Since the stain will not "take" over glue, any squeezed from under the linoleum must be removed. Paint the linoleum with lampblack, as it comes from the can, mixed with a little litharge to hasten drying. A coat of boiled linseed oil on the wood completes the finish. Last, attach the handles and the lid chain.

MATERIAL LIST

2 pieces, 1 by 10 in. by 10 ft., fir, S4S, vertical-grained, if possible.
2 pieces, 1 by 8 in. by 10 ft., fir, S4S.
2 pieces, 1 by 6 in. by 8 ft., fir, S4S.
28 sq. ft. $\frac{3}{4}$ by 4-in. red-cedar lining.
15 doz. upholsterers' tacks, $\frac{1}{2}$ -in. heads.
200 upholsterers' tacks, $\frac{1}{4}$ -in. heads.
1 iron hasp and padlock.

1 pair heavy iron chest handles.
1 pair 2 by $2\frac{1}{2}$ -in. loose-pin butts.
1 lid chain.
2 lb. $\frac{3}{4}$ -in. brads.
1 lb. 1-in. brads.
 $\frac{1}{2}$ lb. each of six-penny and eight-penny finish nails.
 $1\frac{1}{2}$ pt. liquid glue.
Small can each of lampblack and oak oil stain.

Linoleum enough to cover the chest.

Cleaning Rubberized Garments

Rubberized garments cannot be cleaned with gasoline or dry cleaning, as the cemented seams will loosen. When cuffs and collars of such garments become soiled, they should be sponged with a solution of water, ammonia and baking soda in the following proportions: one glass of water, one level teaspoonful of baking soda and one tablespoonful of household ammonia. This will clean and brighten the rubber without injuring it.

Silo Chute Facilitates Feeding

To facilitate feeding his cattle from the silo, one farmer built the chute shown in the photo. The feeding trough was placed directly underneath the chute, and when it is desired to feed the cattle, it is only necessary to toss the silage into the chute. A ladder is arranged inside of the chute to enable the worker to climb into the silo and a trapdoor is provided to close the chute at the point

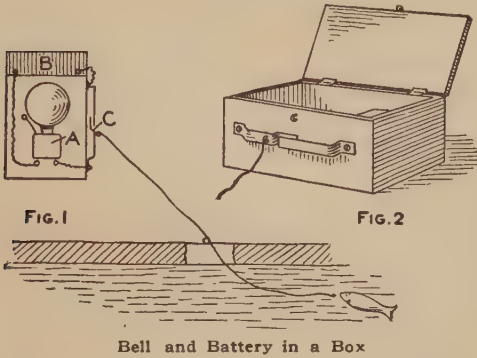
where the spout is located, so that all silage will be diverted through the spout and will drop into the feeding trough. The trapdoor is hinged so that the worker can push it up when climbing up or down the chute, and locks in a vertical position.



The Wooden Chute on the Silo Conveys the Ensilage into the Feeding Trough Below

Fish Signal for Fishing through Ice

Watching a fishline set in a hole cut in the ice on a cold day is very disagreeable, and the usual method is to



Bell and Battery in a Box

have some kind of a device to signal the fisherman when a fish is hooked. The "tipups" and the "jumping jacks" serve their purpose nicely, but a more elaborate device is the electric signal. A complete electric outfit can be installed in a box and carried as conveniently as tackle.

An ordinary electric bell, A, Fig. 1, having a gong $2\frac{1}{2}$ in. in diameter, and a pocket battery, B, are mounted on the bottom of the box. The electric connection to the bell is plainly shown. Two strips of brass, C, are mounted on the outside of the box. The brass strips are shaped in such a way as to form a circuit when the ends are pulled together. The box is opened and set on the ice near the fishing hole. The fish line is hung over a round stick placed across the hole and then tied to the inside strip of brass. When the fish is hooked the line will pull the brass points into contact and close the electric circuit.

Homemade Floor Polisher

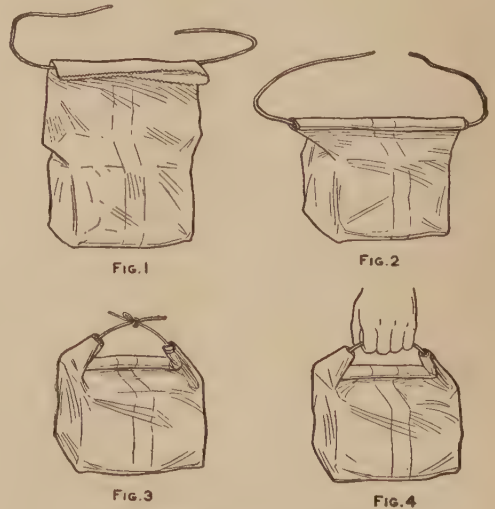
A floor polisher is something that one does not use but two or three times a year. Manufactured polishers come in two sizes, one weighing 15 lb., which is the right weight for family use, and one weighing 25 lb.

A polisher can be made at home that

will do the work just as well. Procure a wooden box such as cocoa tins or starch packages are shipped in and stretch several thicknesses of flannel or carpet over the bottom, allowing the edges to extend well up the sides, and tack smoothly. Make a handle of two stout strips of wood, 36 in. long, by joining their upper ends to a shorter crosspiece and nail it to the box. Place three paving bricks inside of the box, and the polisher will weigh about 16 lb., just the right weight for a woman to use. The polisher is used by rubbing with the grain of the wood.—Contributed by Katharine D. Morse, Syracuse, N. Y.

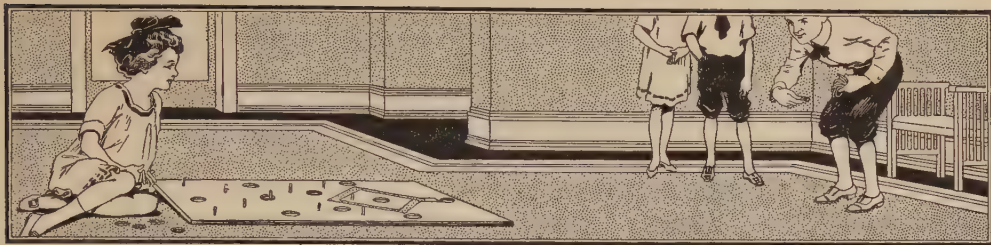
Tying Paper Bag to Make a Carrying Handle

In tying the ordinary paper bag, the string can be placed in the paper in such a way that it will form a handle to carry the package, and also prevent any leakage of the contents. The bag must be long enough for the end to fold over as shown in Fig. 1. The folds are made over the string, as in



Stages in Tying a Bag

Fig. 2. The string is then tied, Fig. 3, to form a handle, Fig. 4.—Contributed by James M. Kane, Doylestown, Pa.



Rabbit Bookcase for Children's Room

By HERBERT C. McKAY

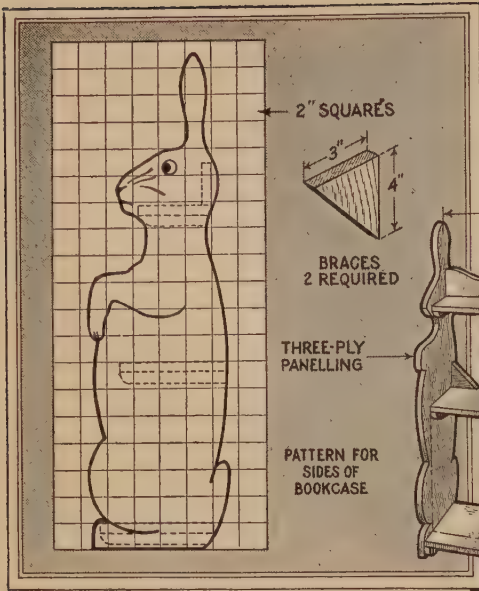
WHEN juvenile books are kept in the family bookcase children do not feel free to take them out when they want to, for the adult members of the family usually object to having their books disturbed. For this reason a bookcase will be found a pleasing addition to the nursery. The books are kept with the other toys, are always accessible for bedtime stories and the child can take them out at any time.

Such a bookcase should be of an appropriate design. The bunny case shown in

the illustration has been found very satisfactory both in shape and appeal to the child. The stock used for making it is the home workers' favorite—three-ply paneling. Two sides are cut out with a scroll or jigsaw, as shown in the layout, the squares being 2 by 2 in. The sides are slightly over 3 ft. high. In addition to the sides, one stop brace or back piece is required for the top shelf. This part is cut from a piece of the same material, 4 by 18 in. in dimensions. The curve can be laid out with a pair of dividers, as indicated, the central curve having a radius of 6 in. and the end curves a 3-in. radius, using the bottom corners of the piece as centers. These curves are connected with two reverse curves of $3\frac{1}{8}$ -in. radius, as shown.



Attractive Children's Bookcase Having Sides to Resemble a Large Bunny Sitting on Its Haunches, Makes Appropriate Addition to Any Nursery

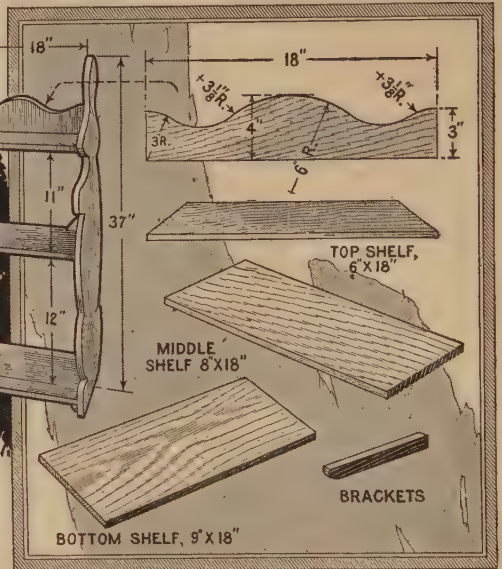


Showing How the Design for the Bunny Bookcase Is Made, What Parts It Consists of, and How Assembled

The top shelf measures 6 by 18 in., and the other two shelves 8 by 18 in. each. Six strips for shelf supports are cut from paneling; these are 1 in. wide and 1 in. shorter than the width of the shelves. The front ends of these strips are rounded off. Finally, two triangular braces are cut from a piece of the same material, 4 by 4 in. in dimensions. The shelf cleats are screwed to the sides; the lower edge of the first one is $1\frac{1}{2}$ in., the second one $13\frac{3}{8}$ in., and the third one $25\frac{1}{4}$ in. from the bottom. The clearance of 12 in. between the two lower shelves provides ample space for large folio-type books. After all the cleats have been screwed in place, the shelves are laid on them and screwed to the cleats and then the sides are screwed to the shelves. It is a good idea to drill holes for the screws before driving them in, the holes being just a little smaller than the thickness of the screw shank. This prevents splitting the wood. The stop brace is put in place at the back of the top shelf, screws being driven into it through the sides and into the edge of the top shelf. The two corner braces are attached at the ends of the middle shelf as shown in the drawing of the assembled case.

All is now ready for painting. Three coats of ivory enamel are applied to the

whole case, after the rough edges are sand-papered smooth. Each coat is allowed to dry thoroughly before the next is applied. When the last coat is dry, the finishing touches are put on. The nose, mouth and eye rims are enameled red, the whiskers



and pupil are black, while the outlines of the legs are pearl-gray with the edges carefully blended into the ivory of the body. The rest of the eye and the tip of the tail are white, while the claws are black.

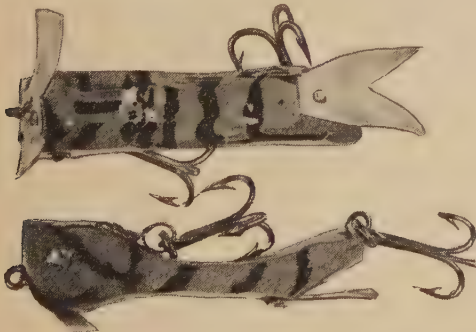
How to Make a Radium Photograph

That radium rays, like X-rays, affect photographic plates, is well known, but it would naturally be supposed that the enormous cost of radium would prevent the making of such a photograph by the amateur. However, a radium photograph can be made at home at practically no cost at all, provided the amateur has patience enough to gather the necessary material, which is nothing else but broken gas mantles. These contain a salt of the rare metal thorium, which is slightly radioactive. Collect a sufficient quantity of broken mantles to cover the bottom of a small cardboard box, a dry-plate box, for instance, with a layer of powdered mantle substance. Upon this layer, and pressed tightly against it, is placed a piece of cardboard; then some metal article to be photographed is laid on

the cardboard box, and covered with sensitized paper. This is again covered with a piece of cardboard and the box is filled with crumpled paper to the top. The cover is then put on, the box is tied up with a piece of string and set in some place where it is sure to be left undisturbed. The radium rays from the powdered mantles penetrate the cardboard and paper, but not the metal article. As the rays are very weak, they must be given four weeks to accomplish their work. After that time, however, a picture of the metal object in white on a dark background will be found on the sensitive paper. Such pictures will not be so sharp as ordinary photographs, because the rays are not focused, but they fairly represent the originals and the experiment is an interesting one.

Effective Fish Lure

A bit of pine wood, a piece of tin and three pins make a good lure for game fish. The photo shows how these floating wood lures are designed, striped with blue-black paint and varnished. The two gangs of treble hooks give it a crawling action, while the hornlike piece on the head is bent to make the bug dip and wobble in the water. The tailpiece is loose and adds to the lifelike appearance by giving the lure a swinging motion. The pins are pushed through, looped and soldered. A pin, through the head makes the eyes, a bit of solder being applied at each end. If luminous paint is applied to the under-



Simple Homemade Lures Which Attract Game Fish side, game fish will strike this bug at night.
—L. S. Landmichl, Riverton, Wyo.

☐ To empty a large sack filled with heavy material, roll it over a barrel.

Model Makers' Vise

In model shipbuilding, and other similar work, there are many small pieces to be sawed, drilled, etc., that are difficult to



Wooden Device with Notches of Different Shapes and Sizes Helps Model Makers

hold solidly. They are apt to be bruised or crushed in a vise and considerable time is lost in operating the vise. With the simple fixture shown in the illustration this trouble can readily be overcome. It consists of two pieces of 1-in. wood, nailed together as indicated, the narrow piece having notches of various shapes and sizes cut along its top to take the different pieces that are to be shaped.

Repair for Cracked Vacuum Bottle

I was going to start the next morning on a 1,000-mile train trip and had to have my quart vacuum bottle for the baby food. Somehow or other it got badly cracked at the last minute, so I thought of mending it with ordinary adhesive tape. I wrapped a 1-in. strip around the bottle twice, then crisscrossed the tape over the cracked spot. There were a dozen or more little cracks besides the big one. I intended to get a new bottle the next day when changing trains, but this was not convenient. The cracked bottle held up well and is still in use.—Mrs. V. S. Martin, Detroit, Mich.

How to Make Corner Pieces for a Blotter Pad

To protect the corners of blotting pads such as will be found on almost every writing desk, proceed as follows:

First, make a design of a size proportionate to the size of the pad and make a right-angled triangle, as shown in Fig. 1, on drawing paper. Leave a small margin all around the edge and then place some decorative form therein. Make allowance for flaps on two sides, as shown, which may later be turned back and folded under when the metal is worked. It should be noted that the corners of the design are to be clipped slightly. Also note the slight overrun at the top with the resulting V-shaped indentation.

To make a design similar to the one shown, draw one-half of it, then fold along the center line and rub the back of the paper with a knife handle or some other hard, smooth surface, and the other half of the design will be traced on the second side. With the metal shears, cut out four pieces of copper or brass of No. 22 gauge and with carbon paper trace the shape and decorative design on the metal. Then cut out the outline and file the edges smooth.

Cover the metal over with two coats of black asphaltum varnish, allowing each coat time to dry. Cover the back and all the face except the white background. Immerse in a solution of 3 parts water, 1 part nitric acid and 1 part sulphuric acid. When the metal has been etched to the desired depth, about 1-32 of an inch, remove it and clean off the asphaltum with turpentine. Use a stick with a rag tied on the end for this purpose so as to keep the solution off the hands and clothes. The four pieces should be worked at the same time, one for each corner.

It remains to bend the flaps. Place the piece in a vise, as shown in Fig. 2, and bend the flap sharply to a right angle. Next place a piece of metal of a thickness equal to that of the blotter pad at the bend and with the mallet bring the flap down parallel to the face

of the corner piece, Fig. 3. If the measuring has been done properly, the flaps ought to meet snugly at the corner. If they do not, it may be neces-

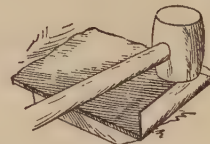
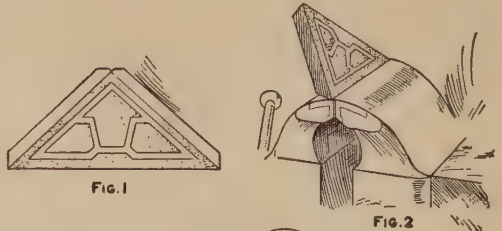


Fig. 3
Manner of Forming the Plates

sary to bend them back and either remove some metal with the shears or to work the metal over farther. All the edges should be left smooth, a metal file and emery paper being used for this purpose.

If a touch of color is desired, it may be had by filling the etched parts with enamel tinted by the addition of oil colors, such as are used for enameling bathtubs. After this has dried, smooth it off with pumice stone and water. To keep the metal from tarnishing, cover it with banana-oil lacquer.

Boring Holes in Cork

The following hints will be found useful when boring holes in cork. In boring through rubber corks, a little household ammonia applied to the bit enables one to make a much smoother hole and one that is nearly the same size at both openings. The common cork, if rolled under the shoe sole, can be punctured easily and a hole can be bored straighter. The boring is made easier by boiling the cork, and this operation insures a hole that will be the desired size and remain the size of the punch or bit used.



How to Make a Shelter Tent

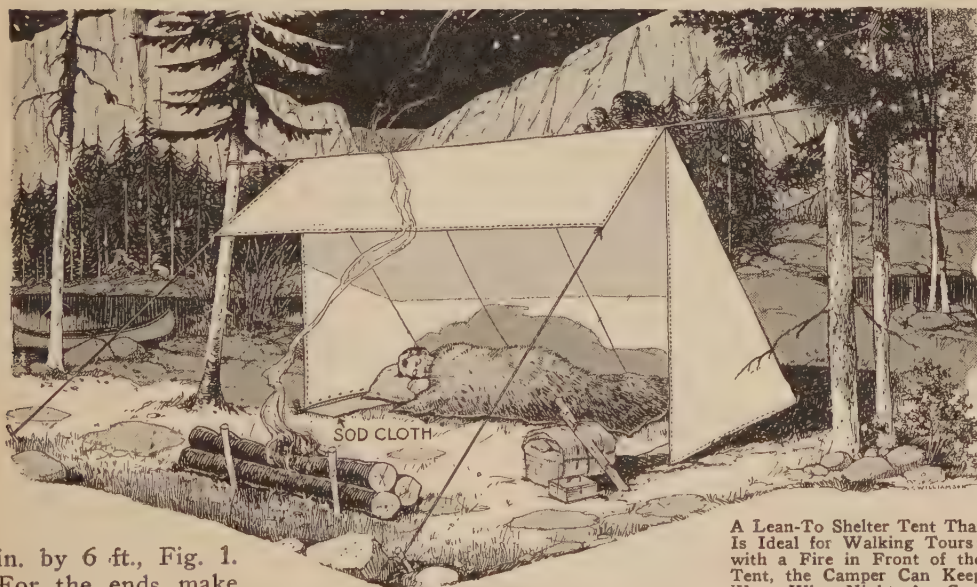
By CLAUDE P. FORDYCE

THE lean-to or "reflecting-baker" tent is one of the simplest types of all and easy to construct at home. It is especially good for cool-region camping when you want a warm shelter. This works like the reflecting baker of our forefathers. A fire, built a few feet in front of the tent on a cold night, with a back-log reflector throws the heat waves to the slanting roof of the tent and down upon the sleeper. The ends keep out drafts and it is easily pitched with the ridge rope between two trees or over forked saplings.

In making the tent, follow the diagram. The "roof" is a rectangle of cloth, 7 ft. 6

sheet. A rope is sewn to the ridge or tie tapes are sewn every 15 in., to be tied to a rope or pole ridge. Around the bottom, sew on a 6-in. sod cloth, to keep out the wind, rain and bugs, and lay the bed to overlap this. For mosquito protection, cover the front with loose cheesecloth sewn to the ridge. Two men traveling together can each take a lean-to and pitch them together and make a wedge or A-tent. If pitched so that the prevailing wind strikes the roof of the tent, you will rest easily and, if cold, a fire in front insures warmth.

This tent is the preferable one for hike

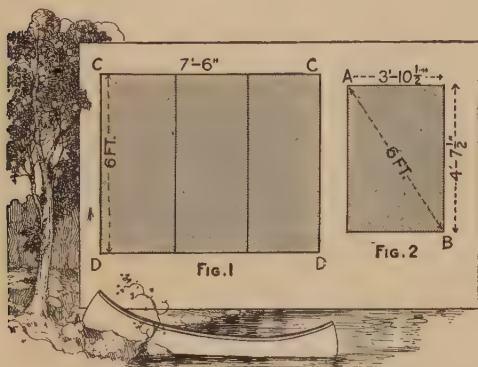


in. by 6 ft., Fig. 1. For the ends make another rectangle, 3 ft. 10½ in. by 4 ft. 7½ in., Fig 2; cut this diagonally from corner to corner and sew these pieces to either end of the large

A Lean-To Shelter Tent That Is Ideal for Walking Tours; with a Fire in Front of the Tent, the Camper Can Keep Warm When Nights Are Cool

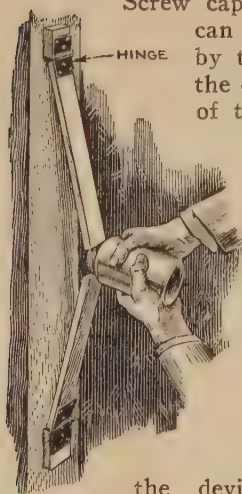
trips where weight must be reduced to the absolute minimum consistent with comfort. Hence the material must be the

lightest waterproof fabric obtainable, and for this there is none surpassing balloon silk or sail cloth, procurable from tent and awning companies. The completed lean-to weighs $3\frac{1}{2}$ lb. Use lightweight tarpon line for the stake loops and ridge rope, and waterproof these along with the



tent so they will not shrink in a rainy spell. Some campers add an awning extension to the ridge, to be pitched horizontally in fair weather, slanting in rainy weather, or it can be made wide enough to be brought down to close the front entirely. One outdoorsman made this awning removable from the tent (attached by snap buttons or tape ties) and in its center he had cut a slit and a neck piece so it can be used as a poncho on the trail.

Loosening Screw Caps



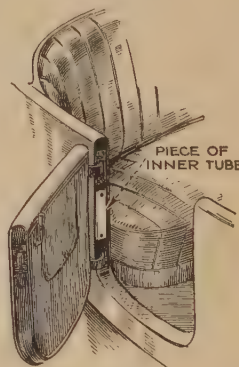
the device approaches the closed position.—L. Pyle, Laporte, Pa.

Ground Wire for Ignition Breaker

Most automobiles have a distributor head on the battery ignition which is moved by the spark lever to control the spark timing. On some cars the bearing in which this part moves becomes worn, and this allows the casing to wobble and fail to ground the primary circuit of the ignition at times. This will cause missing and hard starting. The cars having full automatic spark advance have the distributor head and casing firmly clamped in place and do not wear at this point. The ignition can be kept working, unless the wear is great enough to cause missing by failing to open the points, by attaching a ground wire to the breaker case. One end of this wire is attached to the movable case of the breaker, and the other end is grounded on the motor. With this ground wire in place, the primary current is grounded even if there is a loose and dirty bearing on the breaker case.

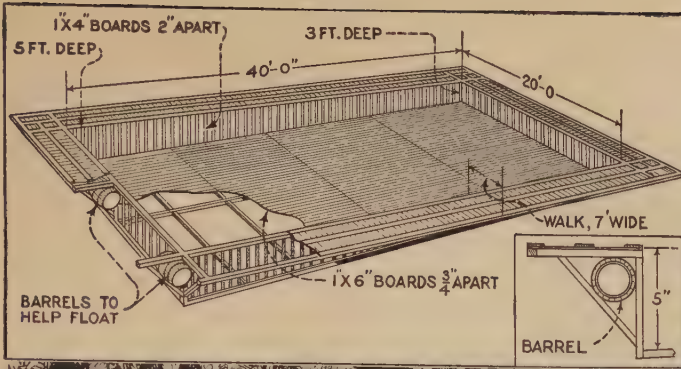
Stopping Auto-Door Rattle

It is often suggested that pieces of rubber be used to check the rattle of car doors. After watching one motorist endeavor to utilize this idea unsuccessfully the writer tacked a piece of inner tube on the hinge side of the door jamb, as shown in the drawing, and eliminated the rattle entirely. If necessary, two or three pieces can be used, depending on the space to be filled.—G. A. Luers, Washington, D. C.

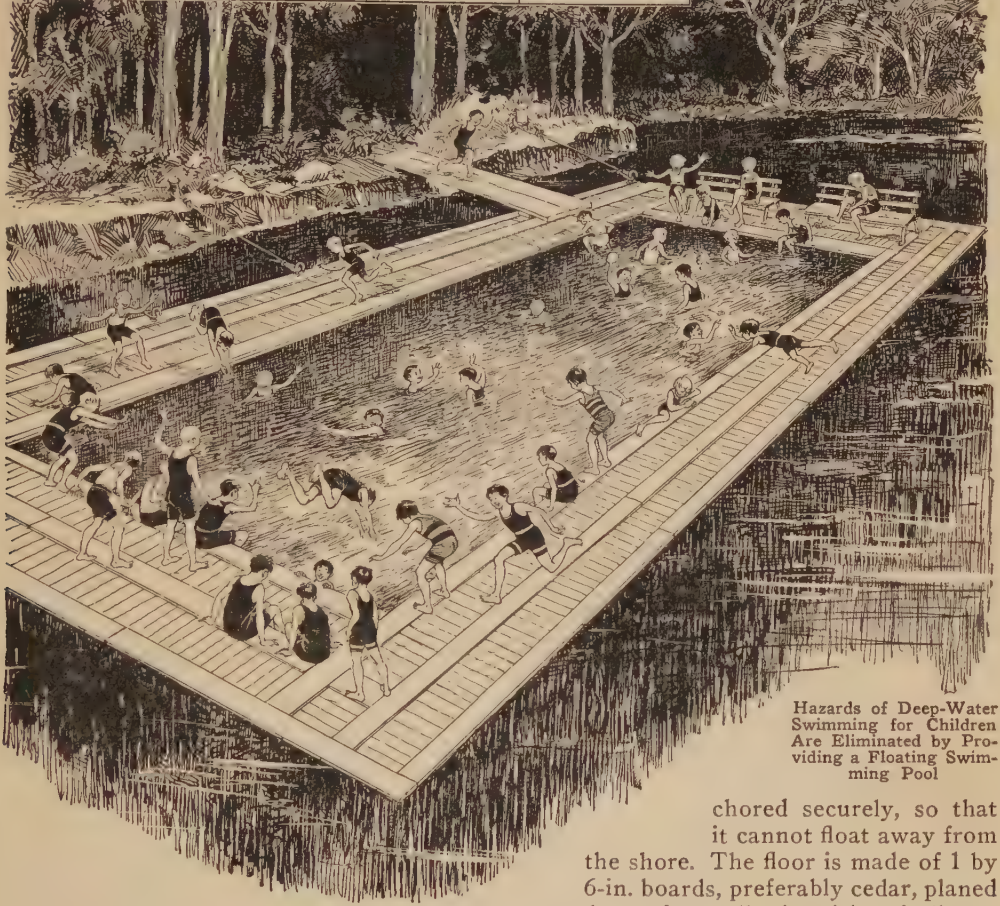


Mangling with Clothes Wringer

When an ironing machine is not available, flat linen, towels, pillow slips, wash cloths, small sheets and other flat pieces can be mangled in an ordinary clothes wringer. Before they are entirely dry, the articles are run through the wringer with the screws set tight. Then the pieces are hung on a clothesline.



all times. The pool is 20 ft. wide and 40 ft. long, inside measurements. It is 3 ft. deep at one end and about 5 ft. at the other. Seats are provided at the shallow end and the whole tank is an-



Hazards of Deep-Water Swimming for Children Are Eliminated by Providing a Floating Swimming Pool

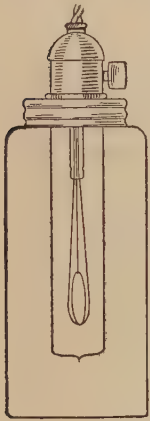
Floating Swimming Pool Safe for Children

A floating swimming pool, which is safe for the children and protects them from the danger of deep water, is in use at Hillsboro, Ill. It is located in a large body of water and its construction is such as to allow a constant change of water at

chored securely, so that it cannot float away from the shore. The floor is made of 1 by 6-in. boards, preferably cedar, planed smooth to forestall the risk of slivers. These boards are spaced about $\frac{3}{4}$ in. apart. The walls are made of 1 by 4-in. boards spaced 2 in. apart. Walks, 7 ft. wide, are arranged around the whole pool. They are made of 1 by 8-in. boards. Barrels are used beneath the walk to help keep the pool afloat.—Herbert C. Crocker, Edwardsville, Illinois.

A Darkroom Lantern

Procure an ordinary 2-qt. glass fruit jar, break out the porcelain lining in the cover and cut a hole through the metal, just large enough to fit over



the socket of an incandescent electric globe, then solder cover and socket together, says Studio Light. Line the inside of the jar with two thicknesses of good orange post-office paper. The best lamp for the purpose is an 8-candlepower show-case lamp, the same as shown in the illustration. Screw the lamp into the socket and screw the cover

onto the jar, and you have a safe light of excellent illuminating power.

When you desire to work by white light, two turns will remove the jar.

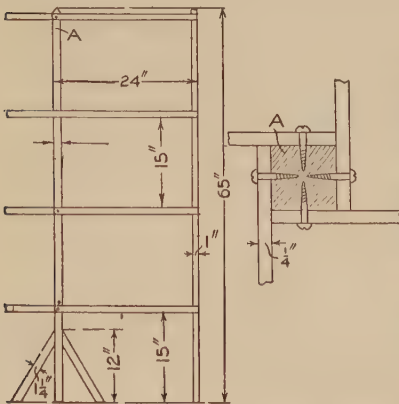
If developing papers are being worked, obtain a second jar and line with light orange paper, screw into the cover fastened to the lamp and you have a safe and pleasant light for loading and development. By attaching sufficient cord to the lamp, it can be moved to any part of the dark-room, and you have three lamps at a trifling cost.

Preventing Vegetables from Burning in a Pot

Many housekeepers do not know that there is a simple way to prevent potatoes from burning and sticking to the bottom of the pot. An inverted pie pan placed in the bottom of the pot avoids scorching potatoes. The water and empty space beneath the pan saves the potatoes. This also makes the work of cleaning pots easier as no adhering parts of potatoes are left to be scoured out.

A Clothes Rack

A clothes-drying rack that has many good features can be made as shown in the illustration. When the rack is



Folding Clothes Rack

be made of any hard wood and the material list is as follows:

- 1 Center post, 1 1/4 in. square by 62 in.
- 4 Braces, 1 1/4 in. square by 12 in.
- 16 Horizontal bars, 1 by 1 1/4 by 24 in.
- 4 Vertical pieces, 3/4 by 1 by 65 in.

Attach the four braces for the feet with finishing nails after applying a good coat of glue.

The horizontal bars are fastened to the vertical pieces with rivets using washers on both sides. The holes are bored a little large so as to make a slightly loose joint. The other ends of the bars are fastened to the center post with roundhead

screws. They are fastened, as shown in the cross-section sketch, so it can be folded up.—Contributed by Herman Fosel, Janesville, Wis.

closed it will fit into a very small space and one or more wings can be used at a time as the occasion or space permits, and not tip over. The rack can

Rustic Window Boxes

Instead of using an ordinary green-painted window box, why not make an artistic one in which the color does not clash with the plants contained in it but rather harmonizes with them.

Such a window box can be made by anyone having usual mechanical ability, and will furnish more opportunities for artistic and original design than many other articles of more complicated construction.

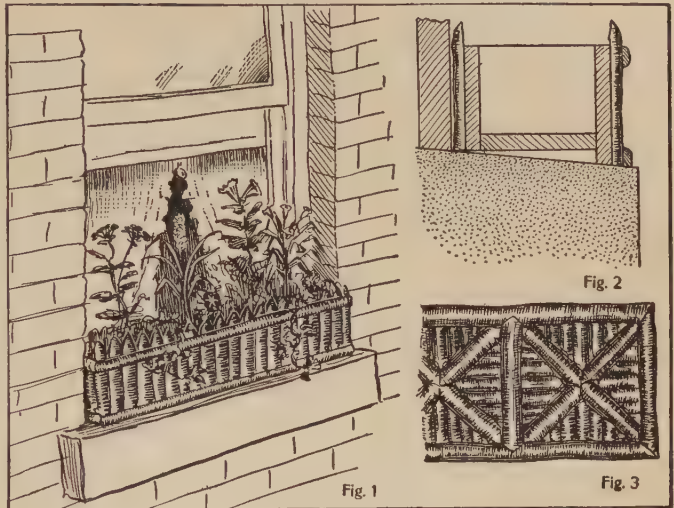
The box proper should be made a little shorter than the length of the window to allow for the extra space taken up in trimming and should be nearly equal in width to the sill, as shown in Fig. 1. If the sill is inclined, as is usually the case, the box will require a greater height in front, to make it set level, as shown in Fig. 2.

The box should be well nailed or screwed together and should then be painted all over to make it more durable. A number of $\frac{1}{2}$ -in. holes should be drilled in the bottom, to allow the excess water to run out and thus prevent rotting of the plants and box.

Having completed the bare box, it may be trimmed to suit the fancy of the maker. The design shown in Fig. 1 is very simple and easy to construct, but may be replaced with a panel or other design. One form of panel design is shown in Fig. 3.

Trimming having too rough a surface will be found unsuitable for this work as it is difficult to fasten and cannot be split as well as smooth trimming. It should be cut the proper length before being split and should be fastened with brads. The half-round hoops of barrels will be found very useful in trimming, especially for filling-in purposes, and by using them

the operation of splitting is avoided. After the box is trimmed, the rustic work should be varnished, in order to thoroughly preserve it, as well as improve its appearance.



Artistic Flower Boxes

Antidote for Squirrel Pest

To the owner of a garden in a town where squirrels are protected by law, life in the summer time is a vexation. First the squirrels dig up the sweet corn and two or three replantings are necessary. When the corn is within two or three days of being suitable for cooking, the squirrels come in droves from far and near. They eat all they can and carry away the rest. When the corn is gone cucumbers, cabbages, etc., share the same fate, being partly eaten into. At the risk of being arrested for killing the squirrels I have used a small target rifle morning and night, but during my absence the devastation went on steadily. Last year they destroyed my entire corn crop. Traps do no good; can't use poison, too dangerous. But I have solved the difficulty; it's easy.

Shake cayenne pepper over the various vegetables which are being ruined, and observe results.

Cycling Clown Amuses the Youngsters

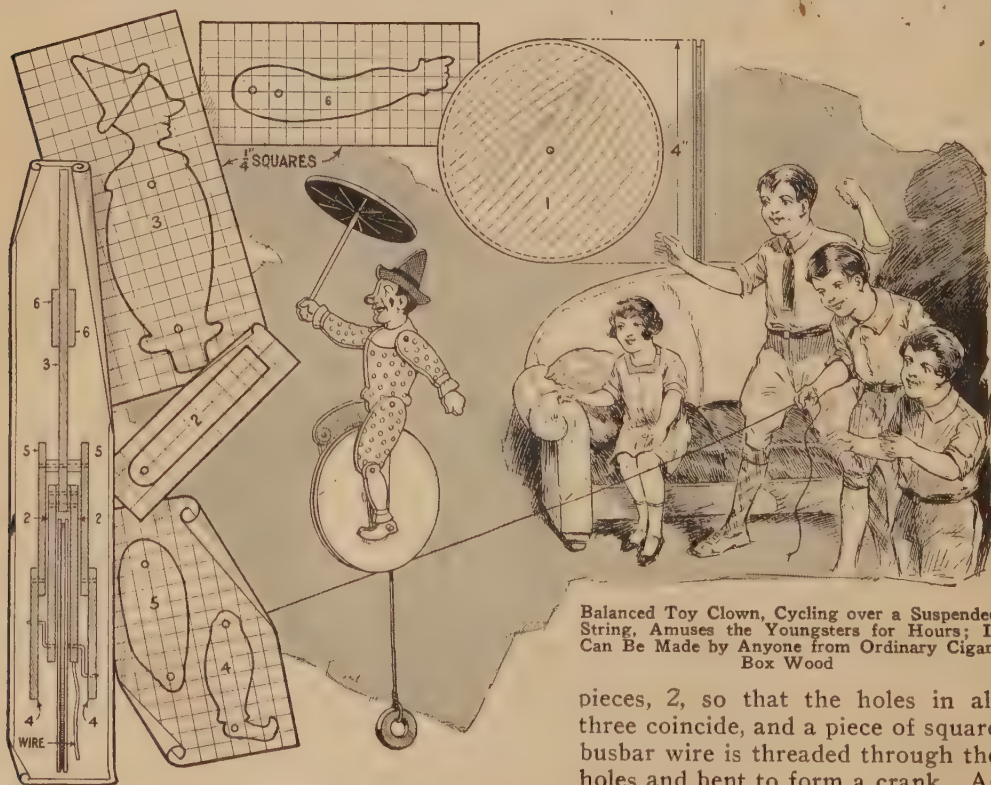
By HERBERT C. McKAY

A CLOWN who rides a monocycle along a taut string will amuse the children for hours and is very easily made. The material used is heavy cigar-box wood, and the only tools required are a scrollsaw and a few others that are found in almost every home.

The pieces are laid out as shown in the drawing, on paper ruled off in $\frac{1}{4}$ -in. squares. The wheel is 4 in. in diameter. A short length of square wire, such as radio busbar, about 1 ft. of 18 or 20-gauge hard iron wire, and a 2-oz. weight are necessary besides the wooden parts. A groove is first cut around the edge of the wheel. If no lathe is available, this can be cut with a handsaw, making the cuts exactly the same depth all around the wheel. Then place the wheel against the saw and turn it, to cut down irregularities in the groove. After the other pieces are cut with the scrollsaw, they should be sandpapered smooth.

Painting is more easily done before the assembly than afterward. The quick-drying lacquers now on the market are best adapted for this kind of work, and the finish is smooth, glossy and brilliant. Naturally the colors chosen will depend on individual taste. In the original, these colors were used: wheel, bright green; clown suit, bright red with yellow polka dots; bands at the wrist, ankle and knee, bright yellow; hat, collar and saddle, lavender; face, white with features in crimson. The umbrella, which may be added if desired, was bright green.

The assembly should proceed in the following way: Attach the square ends of the two pieces, 2, to the bottom of the body, 3, with $\frac{1}{2}$ -in. wire nails, first placing a cardboard spacer on either side of 3; the arms, 6, are nailed to the body in the fixed position shown in the completed figure; the wheel is inserted between the side-



Balanced Toy Clown, Cycling over a Suspended String, Amuses the Youngsters for Hours; It Can Be Made by Anyone from Ordinary Cigar-Box Wood

pieces, 2, so that the holes in all three coincide, and a piece of square busbar wire is threaded through the holes and bent to form a crank. As

it is to serve also as an axle for the wheel, it should fit tightly in the hole in the latter, but loosely in the side-piece holes. A drop of glue at the points where the axle passes through the wheel will help hold the axle firmly. The upper parts of the legs come next. A piece of busbar wire is fixed firmly in the lower body hole (piece 5), a washer, cut from an old auto gasoline pipe, is fitted on either end, and the pieces 5 are placed on the outer ends of the wire so that they will move freely, the washers being of such thickness that the leg pieces will not bind against the pieces 2. The lower legs (4) are fitted loosely to parts 5 and to the crank ends as shown. There is only one thing to watch for; see that the radius of the crank arms is such that the legs never become fully extended, or they may lock, and the wheel refuse to turn. The wire on which the balancing weight is hung is driven into the lower end of one of the pieces 2, and a hook is formed on the lower end for the weight.

Stretch a string tightly in a horizontal position and place the groove of the wheel on the string. By carefully bending the wire you can readily find the best position for the weight so that it will hold the toy upright. If such a position cannot be found, the weight is too light and a heavier one should be substituted. When the balance has been found, lower one end of the string, place the toy at the upper end and it will roll down the string, the legs working in the proper fashion. An umbrella can be made from a disk of cardboard glued to the end of a short stick, which is in turn glued to one of the hands.

☛ A cure for ivy poisoning that never fails is to wash the affected parts with a solution of sulphate of magnesia, commonly known as epsom salts, and then apply sulphur.

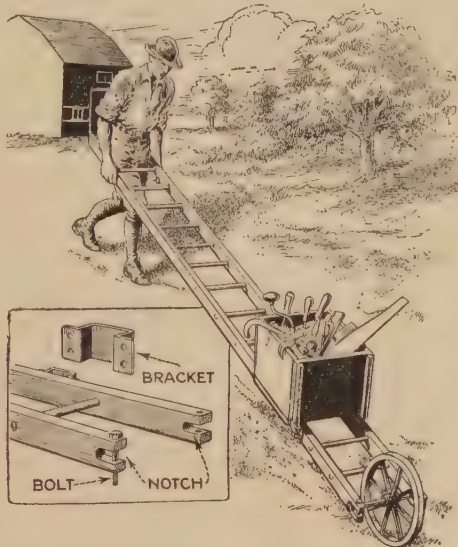
Carrying Ice on Running Board

To carry ice on the running board of a car, take the lid of a small spice can and screw it to the running board, upside down. The edges can be notched but do not necessarily have to be. The holder is not in the way at all and need never be removed. The ice is placed on it, and as it melts, the edges enter into it, so that the piece will not slip off easily.—Thos. F. Johnson, Cuero, Tex.

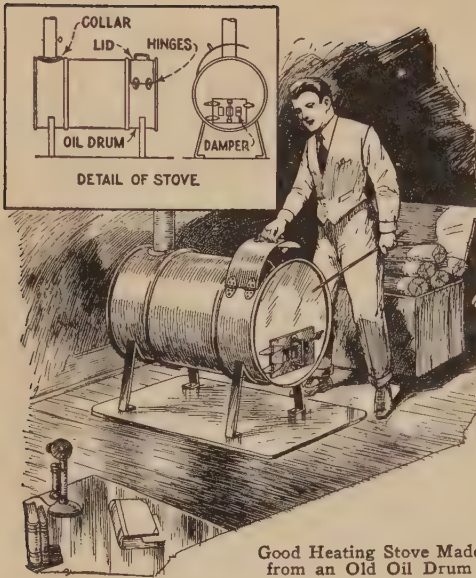


Combination Ladder and Wheelbarrow

For doing odd jobs about the farm, the workman is generally handicapped by the necessity of first wheeling the tools to the scene of operation and then bringing the ladder. By combining the ladder and wheelbarrow as shown in the illustration, much work and time can be saved. Drill a hole in the ends of the ladder sides and cut a slot to accommodate an old barrow wheel and axle. Then drill smaller holes through the sides, at right angles to the slot, to receive long bolts. Make two metal brackets and screw them to the ladder about 18 or 20 in. back of the wheel. Then fit two wooden stakes in these brackets to hold the box of tools.



One Method of Saving Time and Labor on the Farm



Good Heating Stove Made from an Old Oil Drum

Oil Drum Makes Good Stove

In a general store of a small town, the proprietor uses an empty oil drum as a stove. The drum was first cleaned thoroughly inside and then mounted horizontally on two supports of heavy flat iron. The legs were long enough to support the drum about a foot above the floor and were bent so that they could be bolted to it. A 5-in. round hole was cut in the top, at the rear end, around which a collar was riveted to attach a smoke pipe. Then a section of the top, between the two front ribs, was sawed out about a third way around the circumference. A similar section, but slightly larger, was removed from a second drum, a handle provided in the center and hinges at one end, the latter being riveted to the drum. This made a large lid that fitted snugly over the opening. A small rectangular piece was cut out of the front head near the bottom. A slightly larger door with slide openings was made to hinge over the opening and it was fastened with a metal door latch. The entire cost, including that of the drum and a little work by a tinsmith, was less than five dollars.—L. B. Robbins, Harwich, Mass.

❏ In machine work a way must be provided for removing dowel pins before they are driven in place.

Remedy for Jerky Slide Rules

New slide rules, and old ones that are not often used, are frequently so jerky that it is an exasperation to use them. The surfaces of the tongue-and-groove slide grip together and make a careful adjustment almost impossible. Soap, oil and grease are dirty and ineffective lubricants, but lead-pencil graphite seems to fill the rough pores of the wood and give a permanent sliding surface. Simply rub a soft black lead pencil along the tongue and contact surfaces of the slider until they are well coated. Then work the slider back and forth in the slide until the action is smooth.—C. W. Brockunier, Pittsburgh, Pennsylvania.

Removing Stuck Glass Stoppers

The simple method of removing glass stoppers from bottles, as shown in the illustration, has never failed me no matter how tightly they may stick. I grip the bottle in my left hand with my thumb very firmly pressed against one side of the stopper. Then with the right hand I take a wooden stick of medium weight and strike the cork or stopper on the opposite side, directing the blow toward the thumb with a slight tendency upward. At the same time I resist the blow with the thumb. Two or three taps will loosen the tightest stopper and the thumb pressure will prevent either bottle or stopper from being broken.—Gregor H. Glitzke, Kansas City, Mo.



Test for Lubricating Oils

Place one drop of each oil to be tested on a piece of glass so that the drops will be in a line across one end. The glass should be about 3 in. long and wide enough to hold a number of drops in this way without their mixing. Raise the end on which the drops were placed about 6 or 8 in., to

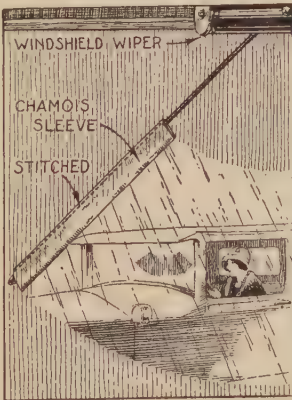
form an inclined plane, so that the oil will run down slowly. An oil having a light body runs and dries quickly, but an oil that has both a body and a free flow will be readily detected by this test. An oil may have a good body and yet have a tendency to gum badly, which will also be detected on the glass. The oils should be protected from dust while the tests are being made.

Improving Flake Glue

A satisfactory glue, which has greater adhesive qualities than the ordinary article, has no disagreeable odor and is suitable for furniture repairing as well as other purposes, can be prepared by putting a quantity of best-grade flake glue in a bottle nearly filled with carbolic acid, diluted with water, and then heating the whole until the glue is thoroughly dissolved. It is best to allow the glue to soak overnight before heating it. The consistency of the glue is controlled by the addition of either the diluted acid or glue. The best results are obtained with a glue having a fairly heavy consistency.—W. J. Edmonds, Jr., Whitehall, N. Y.

Windshield-Wiper Kink

It frequently happens after a dry spell that the windshield wiper is found practically useless, because it does not wipe clean. This is usually because the rubber has dried out. A good remedy is a long chamois sleeve or bag which fits tightly over the wiper. When the chamois becomes wet it adheres snugly to the glass and wipes it clean.



"Roll-Down" Incorporated with a Seesaw Provides Additional Amusement for the Children

Combination "Roll-Down" and Seesaw

To add to the enjoyable exercise of a seesaw, it can be combined with a roll-down game, which will interest children for hours. The seesaw board is removed and a boxlike attachment is built onto it, as shown in the illustration. At each end of the shallow box, sheet-metal strips, bent as indicated in the detail, are nailed, to provide 3-in. pockets. In the middle section of the board rows of nails are driven, spaced about 3 in. apart to produce a diamond-shaped figure. Each pocket is then numbered. With this done, the board is mounted on its support. A small hard-rubber ball is placed on the board and the game begun, the object being to score by rolling the ball into the pockets.

☛ After cleaning a shotgun or a rifle, a cork, large enough to be seen readily, should be placed in the end of the barrel to prevent rusting. The cork should not be pressed into the end deeply as, if it is forgotten, a dangerous explosion results.

Pot-Cover Closet

The sides of the cover closet are cut as shown in Fig. 1 and shelves are nailed between them at a slight angle.



Fig. 1



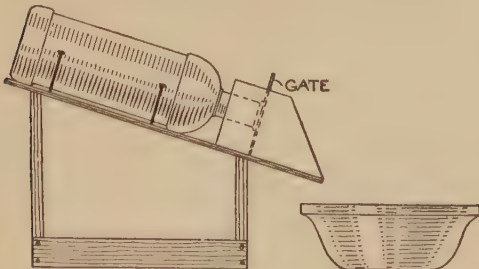
Fig. 2

Closet for Holding Pot Covers

No dimensions are given as the space and the sizes of the covers are not always the same. The back is covered with thin boards placed vertically. The front can be covered with a curtain or a paneled door as shown.—Contributed by Gilbert A. Wehr, Baltimore, Md.

Aid in Mixing Salad Dressing

Some cooks find it a very difficult matter to prepare salad dressing, principally mayonnaise dressing, as the constant stirring and pouring of oil and liquids are required in the operation. The simple homemade device shown in the accompanying sketch greatly as-



Bottle in Stand

sists in this work. It consists of a stand to hold a bottle, the mouth of which rests against a small gate directly in the rear of the attached tin trough. The weight of the bottle and

the contents against the gate serves as a check or stopper. If the gate is raised slightly, it will permit a continuous flow of liquid of the desired amount.

Saving Overexposed Developing Prints

In using developing papers, either for contact printing or enlargements, you are, by all rules of the game, entitled to a certain number of overexposed prints, says a correspondent of Camera Craft. But there is no reason why you should lose either the paper or the time and trouble expended in making these prints. By using the following method, you can turn these very dark prints into good ones.

First: these overexposed prints must be fully developed. Do not try to save them by rushing them out of the developer into the short-stop or fixing bath. The results will be poor, and, if you try to tone them afterward, the color will be an undesirable, sickly one. Develop them into strong prints, thoroughly fix, and wash until you are sure all hypo is removed. In my own practice, I carry out this part of the work thoroughly, then dry the prints and lay aside these dark ones until there is an accumulation of a dozen or more, doing this to avoid too frequent use of the very poisonous bleaching solution. The bleacher is made up as follows and should be plainly marked "Poison."

Cyanide of potassium.....	2 oz.
Iodide of potassium.....	.20 gr.
Water.....	16 oz.

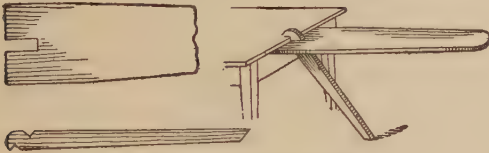
Place the dry print, without previous wetting, in this solution. It will bleach slowly and evenly, but, when it starts to bleach, transfer it to a tray of water, where it will continue to bleach. When the desired reduction has taken place, stop the action at once by immersing the print in a 10-per-cent solution of borax. The prints may be allowed to remain in this last solution until they are finished. A good final washing completes the process. This washing must be thorough and a

sponge or a tuft of cotton used to clean the surface of the print.

With a little practice, this method of saving prints that are too dark becomes easy and certain. The prints are lightened and at the same time improved in tone, being made blue-black with a delicate and pleasing quality that will tempt you to purposely over-expose some of your prints in order to tone them by this method for certain effects. The process is particularly valuable to the worker in large sizes, as it provides a means of making quite a saving of paper that would otherwise be thrown away.

An Ironing-Board Stand

An ordinary ironing board is cut square on the large end and a slot cut $1\frac{1}{2}$ in. wide and 4 in. long to admit the angle support. The support is placed against the table and the board



Stand Attached to Table

is pressed down against the outer notch which jams against the table, thus holding the board rigid and in such a position as to give free access for ironing dresses, etc.—Contributed by T. L. Gray, San Francisco, Cal.

A Desk Blotting Pad

Procure four sheets of blotting paper, preferably the colored kind, as it will appear clean much longer than the white. The size of the pad depends on the size of the blotting paper.

Fold four pieces of ordinary wrapping paper, 5 by 15 in. in size, three times, to make it 5 by 5 in. Fold each one from corner to corner as shown in Fig. 1 and again as in Fig. 2. Paste the last fold together and the corner holders are complete. Put one on each corner of the blotting paper. They

can be fastened with a small brass paper fastener put through the top of the holder. The blotting paper can

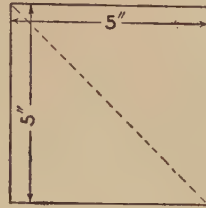


Fig. 1

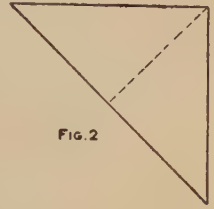


Fig. 2

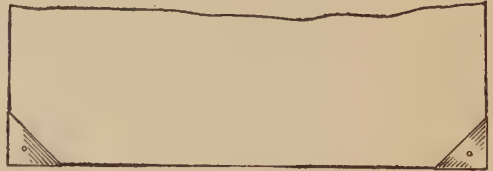


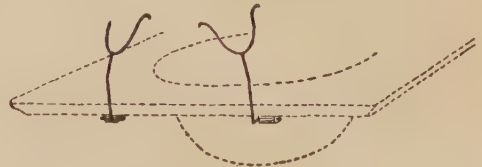
Fig. 3

Paper Corners for Blotter Pads

be easily changed by removing the holders and fasteners. Corners complete are shown in Fig. 3.—Contributed by J. Wilson Aldred Toronto, Canada.

Sleeve Holders for Lavatories

A very handy article is an attachment on wash basins or lavatories for holding the sleeves back while washing the hands. It is very annoying to have the sleeves continually slip down and become wet or soiled. The simple device shown herewith can be made with bent wires or hooks and attached in such a way that it can be dropped out



Wires Attached to a Lavatory

of the way when not in use.—Contributed by L. J. Monahan, Oshkosh, Wisconsin.

CA pencil eraser will remove the tarnish from nickel plate, and the ink eraser will remove the rust from drawing instruments.

How to Make a Brass Bookmark

Secure a piece of brass of No. 20 gauge, having a width of $2\frac{1}{4}$ in. and a length of 5 in. Make a design similar to that shown, the head of which is 2 in. wide, the shaft 1 in. wide below the

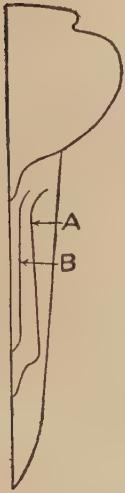


Fig. 1

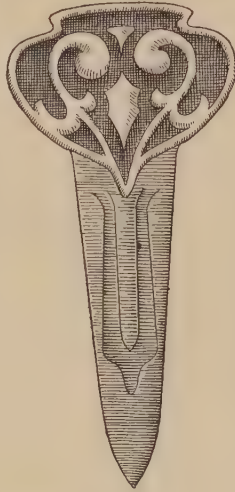


Fig. 2

The Pattern and the Finished Bookmark

head and the extreme length $4\frac{1}{2}$ in. Make one-half of the design, as shown in Fig. 1, freehand, then trace the other half in the usual way, after folding along the center line. Trace the design on the metal, using carbon paper, which gives the outline of the design Fig. 2.

With the metal shears, cut out the outline as indicated by the drawing. With files, smooth off any rough-

A very satisfactory treatment is obtained by etching, then coloring. Clean the metal thoroughly with pumice stone and water or with alcohol before the design is applied. Cover all the metal that is not to be lowered with a thick coating of asphaltum. Allow this to dry, then put on a second coat. After this has dried, thoroughly immerse the metal in a solution composed as follows: 3 parts water, 1 part sulphuric acid, 1 part nitric acid.

Allow the metal to remain in this solution until the exposed part has been eaten about $\frac{1}{8}$ in. deep, then remove it and clean off the asphaltum, using turpentine. Do not put the hands in the solution, but use a swab on a stick.

For coloring olive green, use 2 parts water to 1 part permuriate of iron. Apply with a small brush.

The lines at A and B will need to be cut, using a small metal saw. Pierce a hole with a small drill, Fig. 3, large enough to receive the saw and cut along the lines as in Fig. 4. A piece of wood with a V-shaped notch which is fastened firmly to the bench forms the best place in which to do such sawing. The teeth of the saw should be so placed that the sawing will be done on the downward stroke. The metal must be held firmly, and the saw allowed time to make its cut, being held perpendicular to the work.

After the sawing, smooth the edges of the metal with a small file and emery paper. The metal clip may be bent outward to do this part of the work.

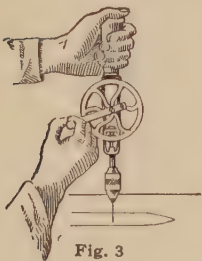


Fig. 3

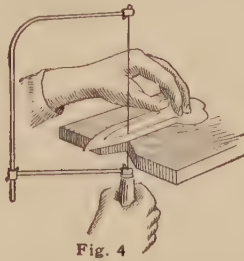


Fig. 4

Drilling and Sawing the Metal

ness and form the edge so that it shall be nicely rounded.

The parts of the design in heavy color may be treated in several ways.

Cheesebox-Cover Tea Tray

The cover from a cheesebox can be converted into a tea tray that is very dainty for the piazza, or for serving an invalid's breakfast.

First sandpaper the wood until it is smooth, then stain it a mahogany color. The mahogany stain can be obtained ready prepared. After the stain has dried, attach brass handles, which can

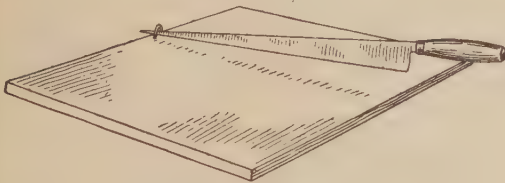
be obtained for a small sum at an upholsterer's shop. A round embroidered doily in the bottom adds to the appearance of the tray.—Contributed by Katharine D. Morse, Syracuse, New York.

Piercing-Punch for Brass

Drill a $\frac{1}{2}$ -in. hole through a block of pine or other soft wood 2 in. thick. Tack over one end of the hole a piece of pasteboard in which seven coarse sewing-machine needles have been inserted. The needles should be close together and pushed through the pasteboard until the points show. The hole is then filled with melted babbitt metal. When this is cold, the block is split and the pasteboard removed. This tool makes neat pierced work and in making brass shades, it does the work rapidly.—Contributed by H. Carl Cramer, East Hartford, Conn.

Kitchen Chopping Board

Cooks can slice, chop or mince vegetables and various other food rapidly by placing the little device, as shown, on a chopping board. It is an ordinary staple, driven in just far enough to allow a space for the end of an ordinary pointed kitchen knife to fit in it. The staple is driven in the edge of the chopping board. The knife can be raised and lowered with one hand, as



Knife Attached to the Board

the material is passed under the blade with the other. Great pressure can be applied and the knife will not slip.—Contributed by M. M. Burnett, Richmond, Cal.

☞ Sew straps to the sides of mattresses and they can be handled much easier.

A Carpenter's Gauge

The home workshop can be supplied with a carpenter's gauge without any expense by the use of a large spool and



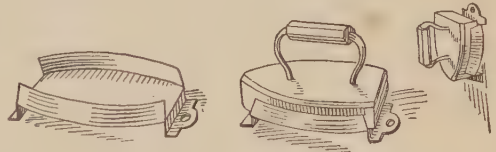
Round Stick in a Spool

a round stick of wood. The stick should be dressed to fit the hole in the spool snugly and a small brad driven through one end so that the point will protrude about $\frac{1}{8}$ in.

The adjustment of the gauge is secured by driving the stick in the hole in the direction desired. A better way and one that will make the adjusting easy is to file the point end of a screw-eye flat and use it as a set screw through a hole in the side of the spool.

A Flatiron Rest

The iron rest and wall hanger shown in the sketch is made of sheet iron. The upturned edges of the metal are



Board or Wall Iron Rest

bent to fit the sloping sides of the iron. The holder and iron can be moved at the same time.—Contributed by W. A. Jaquith, Richmond, Cal.

Use for Paper Bags

When groceries are delivered, save the paper bags and use them for storing bread and cakes. Tie the neck of the bag with a string and it will keep the contents fresh and clean.—Contributed by Mrs. L. H. Atwell, Kissimmee, Florida.

☞ If a little chalk is rubbed on a file before filing steel, it will keep the chips from sticking in the cuts on the file and scratching the work.

Automatic-Closing Kennel Door

When the neighborhood cats are retired for the night and there is nothing more to chase, my fox terrier seems to realize that his usefulness

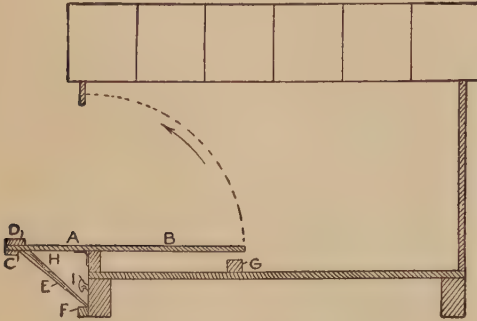


Diagram of Closing Door

for the day is over and begs to be put in his kennel that he may not bark at the moon as some dogs are apt to do. This necessitates my putting him out at a time when it may not be convenient. Frequently in stormy weather this is a disagreeable duty and I found a way to obviate it by making a trapdoor device for his kennel as shown in the sketch whereby he may lock himself in when he crosses the threshold.

The outer half A of the hinged trapdoor is made heavier than the inner half B by a cleat, C, and a strip, D, to cause the door to swing shut. The tripper stick E is set between cleats C and F to hold the door open. When the dog steps on the inner half of the trapdoor B, it falls to stop G, releasing tripper stick E (which is heavier on the top end H) to cause it to fall clear of the path of the trapdoor. The door then swings shut in the direction of the arrow, the latch I engaging a slot in the door as it closes, and the dog has locked himself in for the night. The latch I is made of an old-fashioned gate latch which is mortised in the bottom joist of the kennel. When releasing the dog in the morning the door is set for the evening.—Contributed by Victor Labadie, Dallas, Texas.

Polishing Cloths for Silver

Mix 2 lb. of whiting and $\frac{1}{2}$ oz. of oleic acid with 1 gal. of gasoline. Stir and mix thoroughly. Soak pieces of gray outing flannel of the desired size—15 by 12 in. is a good size—in this compound. Wring the surplus fluid out and hang them up to dry, being careful to keep them away from the fire or an open flame. These cloths will speedily clean silver or plated ware and will not soil the hands.

In cleaning silver, it is best to wash it first in hot water and white soap and then use the polishing cloths. The cloths can be used until they are worn to shreds. Do not wash them. Knives, forks, spoons and other small pieces of silver will keep bright and free from tarnish if they are slipped into cases made from the gray outing flannel and treated with the compound.

Separate bags for such pieces as the teapot, coffee pot, hot-water pot, cake basket and other large pieces of silverware will keep them bright and shining.—Contributed by Katharine D. Morse, Syracuse, N. Y.

A Book-Holder

Books having a flexible back are difficult to hold in an upright position when copying from them. A makeshift combination of paperweights and other books is often used, but with unsatisfactory results.



Fig. 1



Fig. 2

Box Corner Makes a Book Holder

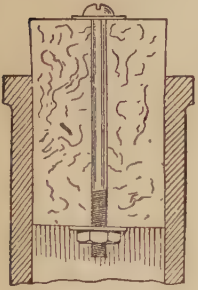
The book-holder shown in the sketch will hold such books securely, allow

the pages to be turned easily and conceal the smallest possible portion of each page.

The holder can be cut out of a box corner and fitted with two screweyes, which have the part shown by the dotted lines at A (Fig. 1) removed. The length of the back board determines the slope for the book rest.—Contributed by James M. Kane, Doylestown, Pa.

Clamping a Cork

It is aggravating to continually break the cork of the stock mucilage bottle because of its sticking to the neck of the bottle after a supply has been poured out. If a stove bolt is inserted lengthwise through the cork with a washer on each end and the nut screwed up tightly, as shown in the sketch, the cork may be made to last longer than the supply of mucilage and can be placed in a new bottle and used over and over again.



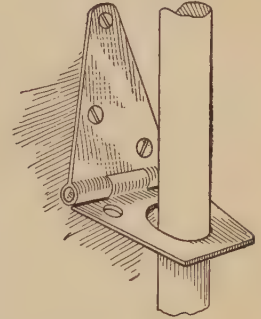
Withdrawing Paper from under an Inverted Bottle

Invert a bottle on a piece of paper near the edge of a table top and ask any one to remove the paper without overturning the bottle. They will at once jerk the paper with the result that the bottle will turn over. To remove the paper just strike the table top with your right fist while pulling the paper slowly with your left hand. As you strike the table the bottle will jump and release the paper.—Contributed by Maurice Baudier, New Orleans, La.

A bone collar button makes a good substitute for a plug in repairing a puncture in a single-tube bicycle tire.

Broom Holder Made of a Hinge

The broom holder shown in the sketch is made of an ordinary hinge with one wing screwed to the wall. The loose wing has a large hole drilled in it to receive the handle of the broom. The manner of holding the broom is plainly shown in the sketch. — Contributed by Theodore L. Fisher, Waverly, Ill.

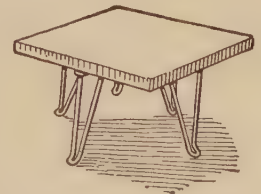


Making Proofs before the Negative Dries

A correspondent of Camera Craft makes proofs from his developed, but unfixed, negatives, by squeezing a sheet of wet bromide paper into contact with the wet film and giving an exposure several times longer than would be required under ordinary conditions, using the paper dry. If the developer is well rinsed out of the film, the exposure to artificial light necessary to make a print will have no injurious effect upon the negative, which is, of course, later fixed and washed as usual.

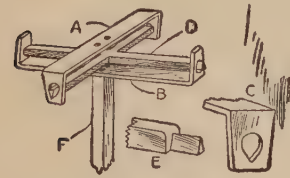
Flower-Pot Stand

A very useful stand for flower pots can be made of a piece of board supported by four clothes hooks. The top may be of any size suitable for the flower pot. The hooks which serve as legs are fastened to the under side of the board in the same manner as fastening the hook to a wall. —Contributed by Oliver S. Sprout, Harrisburg, Pa.



A Line Harmonograph

As an apparatus capable of exciting interest, probably nothing so easily constructed surpasses the harmonograph.



Your attention will be completely absorbed in the ever changing, graceful sweep of the long pendulum, the gyrations of which are faithfully recorded in the resulting harmonogram.

A careless impetus given to the pendulum may result in a very beautiful harmonogram, but you may try innumerable times to duplicate this chance record without success. No two harmonograms are exactly alike. The harmonograph, while its pendulum swings in accordance with well known natural laws, is exceedingly erratic when it comes to obeying any preconceived calculations of its operator. In this uncertainty lies the charm. If time hangs heavily or a person is slightly nervous or uneasy, a harmonograph is a good prescription.

The prime essential in a well working harmonograph is a properly constructed universal joint. Where such a joint is made with pivots for its bearings, one pair of pivots are very liable to have more friction than the other, which retards the movement

and causes the harmonograph to undergo a continuous change of axis. To obviate this difficulty, the joint should be made similar to those used on scales. The general appearance of such a joint is shown in the first illustration, Fig. 1. Stirrups A and B are made of $\frac{7}{8}$ by $\frac{1}{4}$ -in. metal. Holes are drilled in each end of these stirrups and filed out as shown at C. The two holes shown in the center of the stirrup A are drilled to fasten the apparatus to the ceiling. Two corresponding holes are drilled in B to fasten the long pendulum F to the joint. The cross of the joint D has the ends shaped as shown at E. The rounded shoulder on E is to prevent the cross from becoming displaced by a jar or accident. The ends of the cross are inserted through the holes C of the stirrups, then slipped back so the knife edges engage in the V-shaped holes of the stirrups. The cross must be so made that the knife edges will be in the same plane. This can be determined by placing two of the knife edges on the jaws of a vise and then laying two rules across the other two edges. The rules should just touch the jaws of the vise and the two knife edges of the cross. This makes a universal joint almost free from friction and, what is most important, prevents the pendulum from twisting on its own axis.

The pendulum F should be made of ash or oak, $1\frac{3}{4}$ by 2 in., with a length depending on the height of the ceiling. A length of 7 ft. is about right for a 10-ft. ceiling.

A small table or platform, K, as shown in the lower part of Fig. 1, is fastened to the lower end of the pendulum as a support for the cards on which harmonograms are made. A weight, G, of about 30 or 40 lb.—a box filled with small weights will do—is attached to the pendulum just above the table. Another weight of about 10 lb. is attached as shown at H. A pedestal, J, provides a means of support for the stylus. The stylus arm

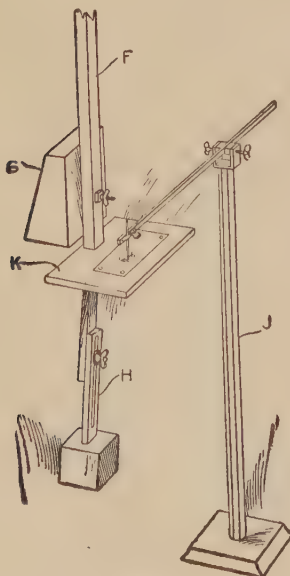


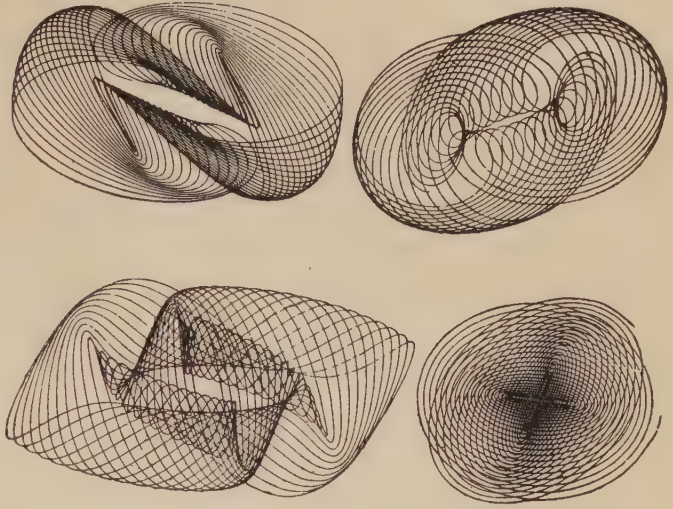
Fig. 1

should have pin-point bearings, to prevent any side motion.

The length of the short pendulum H, which can be regulated, as shown in Fig. 1, should bear a certain and exactly fixed relation to the length of the main pendulum, for the swinging times of pendulums are inversely proportionate to their lengths, and unless the shorter pendulum is, for instance, exactly one-third, one-fourth, one-fifth, etc., as long as the other, that is, makes respectively 3, 4 or 5 swings to one swing of the long pendulum, they will not harmonize and a perfect harmonogram is not obtained.

A good stylus to contain the ink is easily made from a glass tube $\frac{1}{4}$ in. in diameter. Heat the tube in an alcohol or Bunsen flame and then, by drawing the two portions apart and twisting at the same time, the tube may be drawn to a sharp point. An opening of any desired size is made in

the point by rubbing it on a whetstone. Owing to the fact that the style of universal joint described has so little friction, the stylus point must be very



Lines Made with the Harmonograph

fine, or the lines will overlap and blur. A small weight, such as a shoe buttoner, placed on the arm near the stylus will cause enough friction to make the pendulum "die" faster and thus remedy the trouble.—Contributed by Wm. R. Ingham, Rosemont, Arizona.

Cutting Circular Holes in Thin Sheet Metal

In arts and crafts work, occasion often arises to cut a perfectly circular hole in sheet copper or brass. To saw and file it out takes time and skill. Holes up to 3 in. in diameter can be cut quickly and accurately with an ordinary expansive bit.

Fasten the sheet metal to a block of wood with handscrews or a vise. Punch a hole, with a nail set or punch, in the center of the circle to be cut, large enough to receive the spur of the expansive bit. A few turns of the brace will cut out the circle and leave a smooth edge.—Contributed by James T. Gaffney, Chicago.

Key Card for Writing Unreadable Post Cards

A key card for use in correspondence on postals that makes the matter unreadable unless the recipient has a duplicate key card is made as follows: Rule two cards the size of postal, one for the sender and one for the receiver, dividing them into quarters. These quarters are subsequently divided into any convenient number of rectangular parts—six in this case.

These parts are numbered from one to six in each quarter beginning at the outside corners and following in the same order in each quarter. Cut out one rectangle of each number with a sharp knife, distributing them over the

whole card. Then put a prominent figure 1 at the top of one side, 2 at the bottom and 3 and 4 on the other side. The numbering and the cutouts are

is worked by a string passing through the top of the bench and should be weighted on the other end to facilitate the automatic downward movement.

	4	4	1
2	5	5	
	6	6	3
3	6		3
2		5	2
1	4		1

Fig. 1

READ	YOURSELF	WRITTEN	THE
WORLD	SO	POSTED	POPULAR
MECHANICS	ON	YOU	IN
CAN	SCIENCE	MAGAZINE	THE
PROGRESS	TO	AND	UNDERSTAND
IT	MECHANICS	KEEP	OF

Fig. 2

READ	1.	
		POPULAR
MECHANICS		
	MAGAZINE	
	TO	
	2	KEEP

Fig. 3

	YOURSELF	2	
		POSTED	
	ON		
			THE
PROGRESS			
	1		OF

Fig. 4

	3.		THE
WORLD			
			IN
	SCIENCE		
		AND	
	MECHANICS		

Fig. 5

		4.	WRITTEN
		SO	
			YOU
CAN			
			UNDERSTAND
IT			

Fig. 6

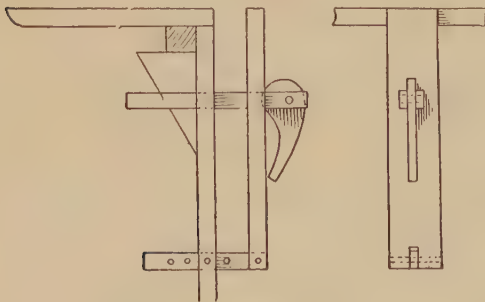
The Key Card

shown in Fig. 1. The two key cards are made alike.

The key card is used by placing it over a postal with the figure 1 at the top and writing in the spaces from left to right as usual, Fig. 3, then put 2 at the top, Fig. 4, and proceed as before, then 3 as in Fig. 5, and 4 as in Fig. 6. The result will be a jumble of words as shown in Fig. 2, which cannot be read to make any sense except by use of a key card.—Contributed by W. J. Morey, Chicago.

Homemade Carpenter's Vise

The sketch shows an easily made, quick-working wood vise that has proved very satisfactory. The usual screw is replaced by an open bar held on one end by a wedge-shaped block,



Vise Made Entirely of Wood

and the excess taken up on the other end by an eccentric lever. The wedge

The capacity of the vise, of course, depends on the size and shape of the wedge-shaped block.—Contributed by J. H. Cruger, Cape May City, N. J.

Toning Blue on Bromide and Platinum

After some experimenting to secure a blue tone on bromide prints, a correspondent of the Photographic Times produced a very pleasing bluish green tint by immersing the prints in a solution composed of 30 gr. of ferricyanide of potash, 30 gr. citrate of iron and ammonia, $\frac{1}{2}$ oz. acetic acid and 4 oz. of water. After securing the tint desired, remove the prints, rinse them in clean water for a few minutes, and then place them in a dilute solution of hydrochloric acid. Wash the prints thoroughly and hang them up with clips to dry.

Cutting Loaf Bread

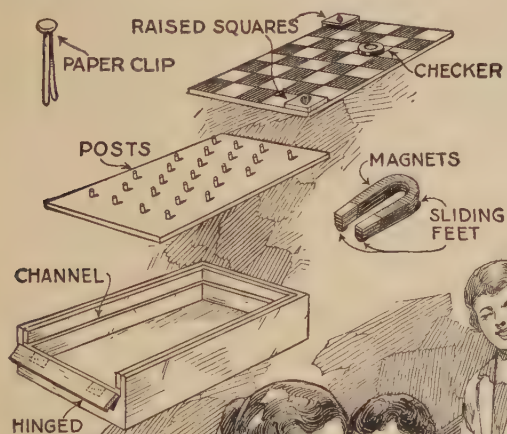
When cutting a loaf of bread do not slice it from the outer crusted end. Cut through the center, then cut slices from the center toward the ends. The two cut surfaces can be placed together, thus excluding the air and keeping the bread fresh as long as there is any left to slice.—Contributed by L. Alberta Norrell, Augusta, Ga.

How to Make a Magnetic Maze Puzzle

By H. F. GOODWIN

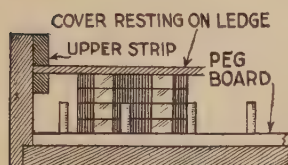
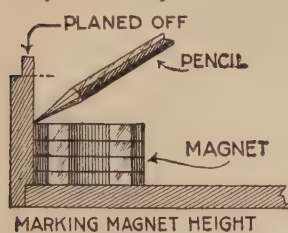
HERE is an easily made maze that is sure to interest the puzzle fan, as it is so arranged that the maze itself is invisible to the operator. It is simple in construction, can be made in a short time and involves practically no expense except for the magnets. The other materials needed are some cigar boxes, which any tobacco dealer will be glad to give you, three paper clips of the kind illustrated, some strong glue and a sheet of thin but tough cardboard. The four magnets needed should be of the horseshoe type, about 2 in. long, and can be bought in any five and ten-cent store.

First remove the cover from a perfectly sound cigar box. The best box for this purpose is one having metal hinges on the cover and a flange running around the top over which the cover fits. After removing the cover, the flange should be planed off. Then take the bottom piece of another box, making sure that it is perfectly straight, and trim the edges so that it will fit snugly in the bottom of the first box. This forms the floor in which the pegs are inserted. Now take four magnets and glue them together so as to form one magnet of the required strength. In order to slide freely when the box is tilted the magnet is furnished with sliding feet. These are simply the heads of the brass paper clips, the prongs of which have been cut off with scissors, and are glued to the bottom of the magnet as illustrated.



An Easily Made Puzzle That Will Take a Lot of "Solving" and Provide Amusement for Hours at a Time

When the magnet is ready, place it on the floor of the box and move it around the inside edge of the box, marking its height with a pencil. This should be done very carefully. With the floor still in



SECTION THROUGH PUZZLE

place, cut out thin strips of wood, which, when glued around the inside edge, will come exactly even with the pencil marks. This ledge forms the support for the cardboard cover. With the floor and ledge in place but not fastened permanently, take a pencil and dot the floor where the pegs are to be inserted, using the magnet as a guide. These dots should be placed in staggered rows, and it will be found, by a little practice, that they can be placed quite closely, as the inside edge of the magnet slides around and pivots on the pegs.

Take out the floor and insert the pegs, which should be only about one half the height of the magnet. Return the floor to the box and glue in the inside ledge. Now you are ready for the cardboard cover. This should be cut so that, when laid flat in the box, it is supported by the ledge. The cardboard is ruled off into checkerboard squares and has two squares on diagonal corners raised on small pieces of cardboard so as to allow the iron man or checker to slide underneath. These raised corners are decorated, respectively, with a diamond and a heart cut from old playing cards. A smaller diamond is glued on the face of the iron checker.

Before permanently fixing the cover to the box it is advisable to try out the puzzle. This can be done by placing the magnet in the box and, while holding the cover on with your fingers, tilting the box back and forth so as to see if the magnet slides freely, using the iron checker as an indicator. Though the magnet should be unhampered in its action, it is very important that the cardboard cover be laid di-

rectly on the magnet so that they touch. Now is the time to make any alterations that are necessary.

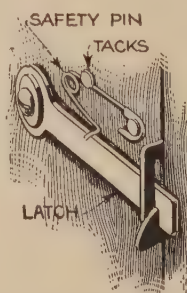
If everything is correct, put in the magnet and place the cover in position; then glue strips of wood around the inside edge. Have these strips even with the top and extend them down so as to almost, but not quite, touch the cardboard. This allows for a slight give to the cover so that the magnet will not be bound. If desired, you can use the hinges that came with the cigar box to make a hinged flap, as shown in the illustration. This permits the removal of the cardboard cover at any time.

The object of the puzzle is to move the checker from the space under the raised square marked with the diamond to that under the square marked with the heart by merely tilting the box. It will be apparent that the movement of the checker is controlled entirely by the concealed magnet which prevents the checker from sliding along any other path on the checkerboard than the magnet follows in the box. The magnet becomes hooked upon various pegs and the operator, being unable to see these posts or to know what is impeding the progress of the checker, will have great difficulty in bringing it into the desired space.

In tilting the box, one caution should be observed and that is not to jerk it too abruptly so as to cause the checker to leave the magnetic influence. If this does happen, the checker can be anchored again by simply letting it slide over the cover until it comes to rest over the magnet.

Quick-Acting Thumb Latch

An ordinary thumb latch usually fails to work if the door to which it is attached



is quickly shut. This annoyance can easily be eliminated by attaching a safety pin to the door to form a downward-acting spring, as shown in the drawing. By this means the latch will be snapped down into its seat even though the door may be slammed

shut violently.—Dexter W. Allis, Asbury Grove, Mass.

How to Remove a Stuck Rag from Gun Barrel

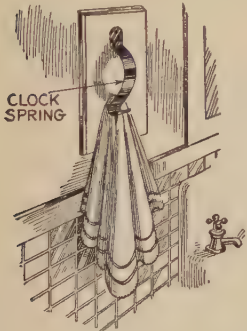
A rag that has become lodged in a small-caliber rifle barrel during a cleaning operation may easily be removed in the following way: Measure the gun barrel and get a piece of stiff wire a little over half its length after allowance has been made for a loop at one end. Fashion and sharpen the other end like a crochet hook, so that it will easily pierce the cloth wedged in the rifle. If the end of the cloth cannot be reached, get another piece of wire and split the end with a chisel instead of making a single point. Sharpen these ends and make a few nicks in the ends of both with the punch so that the wire will cling to the rag when the wire is twisted. No matter how firmly the rag sticks, the jagged edges will get such a good hold that it can be pulled out.



Lengths of White Tape Serve as Guide Lines in Underwater Swimming Contest

Clock-Spring Towel Clip

Towel clips can be made in a few moments from pieces of old clock or phonograph springs, as shown in the illustration. One end is straightened and drilled to receive two or three small wood screws, with which it is fastened to a wooden base. The other end is turned over as shown, so that when a towel is pushed under it, the spring will grip it securely, but still allow it to be pulled away.—E. A. Goering, Langenburg, Can.



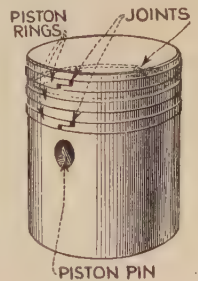
Lines Guide Underwater Swimmers

When several persons dive at once for an underwater swimming race, they are likely to collide and interfere with each other because of their inability to see the course clearly. This trouble was overcome at one club by marking white guide

lines at the bottom of the pool. A number of lengths of white tape, of the kind used in marking tennis courts, were provided, each being as long as the course. Heavy lead fishline sinkers were fastened to the tape at intervals of 6 or 8 ft. and the tape laid along the bottom in a straight line from the starting to the finishing line. The tapes are spaced far enough apart to prevent interference.—L. B. Robbins, Harwich, Mass.

Arranging Piston Rings

Although it is a well-known practice to stagger the ends of piston rings so that the joints are not in line, the attention of the amateur should be called to this most important detail of assembly, when overhauling his motor. When slipping the piston back in place, take care that the ends of the rings are not above each other for by such an arrangement loss of compression would be sure to follow.—G. C. Douglas, Raleigh, N. C.



How to Build a Toboggan Sled

By A. BOETTE

The first object of the builder of a sled should be to have a "winner," both in speed and appearance. The accompanying instructions for building a sled are designed to produce these results.

The sled completed should be 15 ft. 2 in. long by 22 in. wide, with the cushion about 15 in. above the ground. For the baseboard select a pine board 15 ft. long, 11 in. wide and 2 in. thick, and plane it on all edges. Fit up the baseboard with ten oak foot-rests, 22 in. long, 3 in. wide and $\frac{3}{4}$ in. thick. Fasten them on the under side of the baseboard at right angles to its length and 16 in. apart, beginning at the rear. At the front 24 or 26 in. will be left without cross bars for fitting on the auto front. On the upper side of the cross bars at their ends on each side screw a piece of oak 1 in. square by 14 ft. long. On the upper side of the baseboard at its edge on each side screw an oak strip 3 in. wide by $\frac{3}{4}$ in. thick and the length of the sled from the back to the auto front. These are to keep the cushion from falling out. See Fig. 1. For the back of the sled use the upper part of a child's high chair, taking out the spindles and resetting them in the rear end of the baseboard. Cover up the outside of the spindles with a piece of galvanized iron.

The construction of the runners is shown by Figs. 2 and 3. The stock required for them is oak, two pieces 30 in. by 5 in. by $1\frac{1}{4}$ in., two pieces 34 in. by 5 in. by $1\frac{1}{4}$ in., two pieces 14 in. by 6 in. by 2 in., and four pieces 14 in. by 2 in. by 1 in. They should be put together with large screws about 3 in. long. Use no nails, as they are not substantial enough. In proportioning them the points A, B and C, Fig. 2, are important. For the front runners these measurements are: A, 30 in.; B, 4 in.; C, $15\frac{1}{2}$ in., and for the rear runners: A, 34 in.; B, 7 in.; C, $16\frac{1}{2}$ in. The screw-

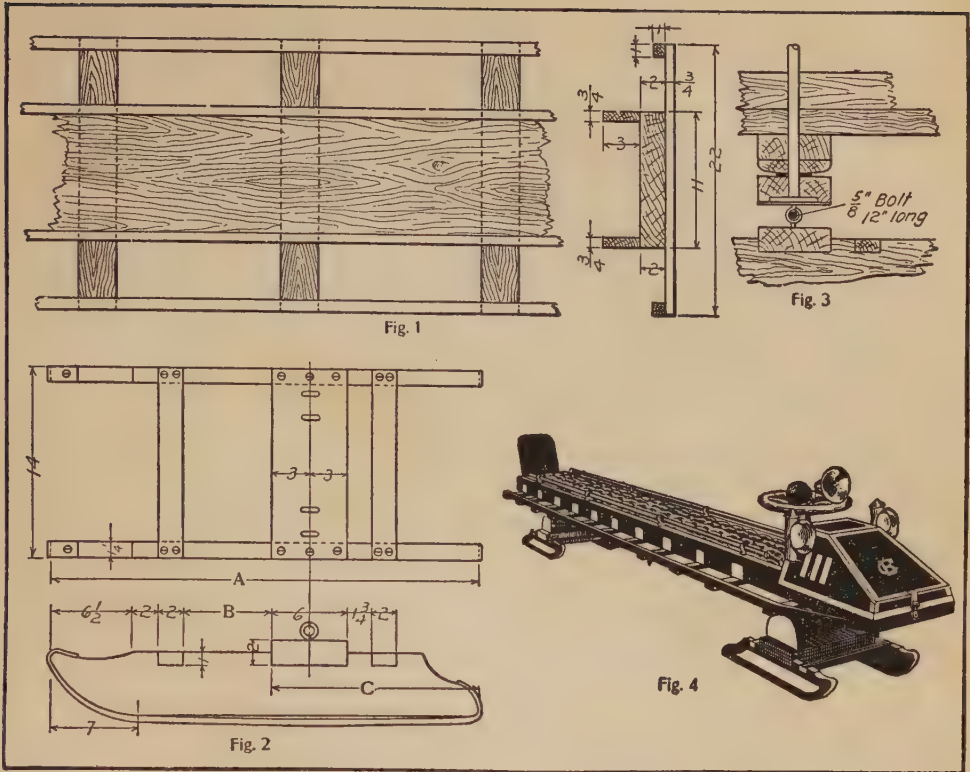
eyes indicated must be placed in a straight line and the holes for them carefully centered. A variation of $\frac{1}{16}$ in. one way or another would cause a great deal of trouble. For the steel runners use $\frac{3}{8}$ -in. cold-rolled steel flattened at the ends for screw holes. Use no screws on the running surface, however, as they "snatch" the ice.

The mechanism of the front steering gear is shown at Fig. 3. A $\frac{3}{4}$ -in. steel rod makes a good steering rod. Flatten the steering rod at one end and sink it into the wood. Hold it in place by means of an iron plate drilled to receive the rod and screwed to block X. An iron washer, Z, is used to reduce friction; bevel block K to give a rocker motion. Equip block X with screweyes, making them clear those in the front runner, and bolt through. For the rear runner put a block with screweyes on the baseboard and run a bolt through.

Construct the auto front (Fig. 4) of $\frac{3}{4}$ -in. oak boards. The illustration shows how to shape it. Bevel it toward all sides and keep the edges sharp, as sharp edges are best suited for the brass trimmings which are to be added. When the auto front is in place enamel the sled either a dark maroon or a creamy white. First sandpaper all the wood, then apply a coat of thin enamel. Let stand for three days and apply another coat. Three coats of enamel and one of thin varnish will make a fine-looking sled. For the brass trimmings use No. 27 B. & S. sheet brass 1 in. wide on all the front edges and pieces 3 in. square on the cross bars to rest the feet against. On the door of the auto front put the monogram of the owner or owners of the sled, cutting it out of sheet brass.

For the steering-wheel procure an old freight-car "brake" wheel, brass-plated. Fasten a horn, such as used on automobiles, to the wheel.

Make the cushion of leather and stuff it with hair. The best way is to get some strong, cheap material, such as burlap, sew up one end and make in



Constructing a "Winner" Toboggan Sled

the form of an oblong bag. Stuff this as tightly as possible with hair. Then get some upholstery buttons, fasten a cord through the loop, bring the cord through to the underside of the cushion, and fasten the button by slipping a nail through the knot. Then put a leather covering over the burlap, sewing it to the burlap on the under side. Make the cushion for the back in the same way. On top of the cushion supports run a brass tube to serve the double purpose of holding the cushion down and affording something to hold on to.

If desired, bicycle lamps may be fastened to the front end, to improve the appearance, and it is well to have a light of some kind at the back to avoid the danger of rear-end collisions.

The door of the auto front should be hinged and provided with a lock so that skates, parcels, overshoes, lunch, etc., may be stowed within. A silk

pennant with a monogram adds to the appearance.

If desired, a brake may be added to the sled. This can be a wrought-iron lever $1\frac{1}{2}$ in. by $\frac{1}{2}$ in. by 30 in. long, so pivoted that moving the handle will cause the end to scrape the ice. This sled can be made without lamps and horn at a cost of about \$15, or with these for \$25, and the pleasure derived from it well repays the builder. If the expense is greater than one can afford, a number of boys may share in the ownership.

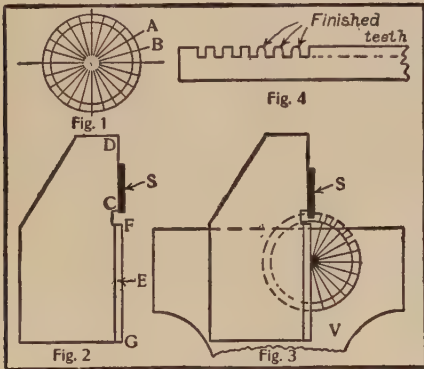
Burning Inscriptions on Trees

Scrape off the bark just enough to come to the first light under coating, which is somewhat moist. With a lead pencil make an outline of the inscription to be burnt on the tree and bring the rays of a large magnifying glass not quite to a fine focus on the same. The tree will be burnt along the

pencil marks, and if the glass is not held in one spot too long, the inscription will be burnt in as evenly as if it had been written.—Contributed by Stewart H. Leland, Lexington, Ill.

How to Make Small Gearwheels Without a Lathe

To make small models sundry small gears and racks are required, either cut for the place or by using the parts from an old clock. With no other tools than a hacksaw, some files, a compass,



Making Model Wheels

and with the exercise of a little patience and moderate skill, very good teeth may be cut on blank wheels.

First take the case of a small gear-wheel, say 1 in. outside diameter and $\frac{1}{8}$ in. thick, with twenty-four teeth. Draw a circle on paper, the same diameter as the wheel. Divide the circumference into the number of parts desired, by drawing diameters, Fig. 1. The distance AB will be approximately the pitch. Now describe a smaller circle for the base of the teeth and halfway between these circles may be taken as the pitch circle.

Now describe a circle the same size as the largest circle on a piece of $\frac{1}{8}$ -in. sheet metal, and having cut it out and filed it up to this circle, fasten the marked-out paper circle accurately over it with glue. Saw-cuts can now be made down the diameters to the smaller circle with the aid of a saw guide, Fig. 2, made from $\frac{1}{8}$ -in. mild steel or iron. This guide should have a beveled edge, E, from F to G, to lay

along the line on which the saw-cut is to be made. The straight-edge, CD, should be set back one-half the thickness of the saw-blades, so that the center of the blade, when flat against it, will be over the line FG. A small clearance space, FC, must be made to allow the teeth of the saw to pass.

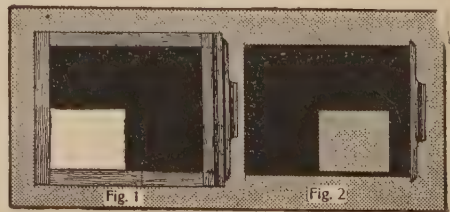
The guide should then be placed along one of the diameters and held in position until gripped in the vise, Fig. 3. The first tooth may now be cut, care being taken to keep the blade of the saw flat up to the guiding edge. The Model Engineer, London, says if this is done and the saw-guide well made, the cut will be central on the line, and if the marking-out is correct the teeth will be quite uniform all the way round. A small ward file will be needed to finish off the teeth to their proper shape and thickness.

In making a worm wheel the cuts must be taken in a sloping direction, the slope and pitch depending on the slope and pitch of the worm thread, which, though more difficult, may also be cut with a hacksaw and file.

A bevel wheel should be cut in the same manner as the spur wheel, but the cut should be deeper on the side which has the larger diameter. To cut a rack the pitch should be marked along the side, and the guide and saw used as before (Fig. 4).

How to Make Four Pictures on One Plate

Secure two extra slides for the plate-holders and cut one corner out on one



Four Photos on One Plate

of them, as shown in Fig. 1. Make a hole in the other, as shown in Fig. 2. With a lead pencil draw on the ground

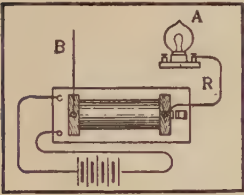
glass one line vertical and one horizontal, each in the center. This will divide the ground glass into four equal parts.

Focus the camera in the usual manner, but get the picture desired to fill only one of the parts on the ground glass. Place the plate-holder in position and draw the regular slide; substitute one of the slides prepared and expose in the usual way.

If a small picture is to be made in the lower left-hand corner of the plate, place the prepared slide with the corner cut, as shown in Fig. 1. The slide may be turned over for the upper left-hand corner and then changed for slide shown in Fig. 2 for the upper and lower right-hand corners.

Electric Blue-Light Experiment

Take a jump-spark coil and connect it up with a battery and start the vibrator. Then take one outlet wire, R, and connect to one side of a 2-cp. electric lamp, and the other outlet wire, B, hold in one hand, and press all fingers of the other hand on globe at point A. A bright, blue light will come from the wires in the lamp to the surface of the globe where the fingers touch. No shock will be perceptible.

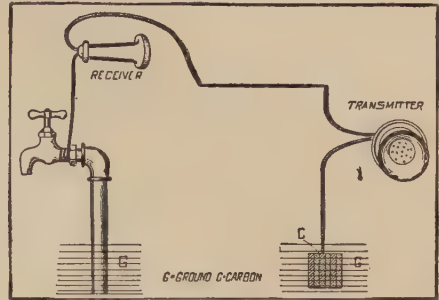


Interesting Electrical Experiment

The materials necessary for performing this experiment are: Telephone receiver, transmitter, some wire and some carbons, either the pencils for arc lamps, or ones taken from old dry batteries will do.

Run a line from the inside of the house to the inside of some other building and fasten it to one terminal of the receiver. To the other terminal fasten another piece of wire and ground it on the water faucet in the house. If there is no faucet in the house, ground it with a large piece of zinc.

Fasten the other end to one terminal of the transmitter and from the other terminal of the same run a wire into the ground. The ground here should consist either of a large piece of carbon,



A Unique Battery

or several pieces bound tightly together.

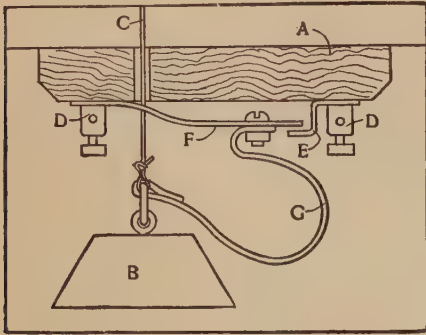
If a person speak into the transmitter, one at the receiver can hear what is said, even though there are no batteries in the circuit. It is a well-known fact that two telephone receivers connected up in this way will transmit words between two persons, for the voice vibrating the diaphragm causes an inductive current to flow and the other receiver copies these vibrations. But in this experiment, a transmitter which induces no current is used. Do the carbon and the zinc and the moist earth form a battery?—Contributed by Wm. J. Slattery, Emsworth, Pa.

A Cheap Fire Alarm

An electrical device for the barn that will give an alarm in case of fire is shown in the accompanying diagram. A is a wooden block, which is fastened under the loft at a gable end of the barn; B is an iron weight attached to the string C, and this string passes up through the barn to the roof, then over a hook or pulley and across the barn, under the gable, and is fastened to the opposite end of the barn.

D D are binding posts for electric wires. They have screw ends, as shown, by which means they are fastened to the wooden block A. They also hold the brass piece E and the

strip of spring brass F in place against the wooden block. G is a leather strap fastened to the weight B and the spring F connected to the latter by a small sink bolt.



Electric Fire Alarm

At the house an electric bell is placed wherever convenient. Several battery cells, of course, are also needed. Dry batteries are most convenient. The battery cells and bell are connected in the usual manner, and one wire from the bell and one from the battery are strung to the barn and connected to the binding posts D D.

If a fire occurs in the hay-mow the blaze will generally shoot toward the gable soon after it starts, and will then burn the string C, which allows the weight B to fall and pull the brass spring against the iron piece E, which closes the circuit and rings the bell in the house.

If desired, the string may be stretched back and forth under the roof several times or drawn through any place that is in danger of fire.—Contributed by Geo. B. Wrenn, Ashland, Ohio.

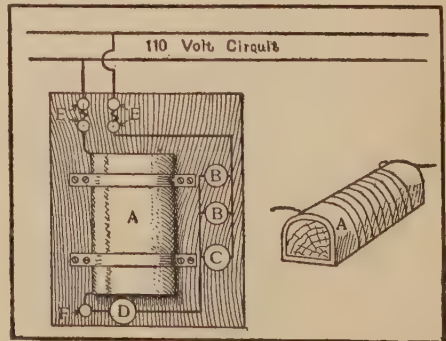
How to Make a Small Electric Furnace

Take a block of wood and shape into a core. One like a loaf of bread, and about that size, serves admirably. Wrap a layer of asbestos around it and cover this with a thin layer of plaster-of-paris. When the plaster is nearly dry wind a coil of No. 36 wire around it, taking care that the wire does not touch itself anywhere. Put another

course of plaster-of-paris on this, and again wind the wire around it. Continue the process of alternate layers of plaster and wire until 500 ft. or more of the latter has been used, leaving about 10 in. at each end for terminals. Then set the whole core away to dry.

For a base use a pine board 10 in. by 12 in. by 1 in. Bore four holes at one end for binding-posts, as indicated by E E. Connect the holes in pairs by ordinary house fuse wire. At one side secure two receptacles, B B, and one single post switch, C. Place another switch at I and another binding-post at F. The oven is now ready to be connected.

Withdraw the wooden core from the coils of wire and secure the latter by bands of tin to the board. Connect the ends of the wire to binding-posts E and F, as shown. From the other set of binding-posts, E, run a No. 12 or No. 14 wire, connecting lamp receptacles, B B, and switch, C, in parallel. Connect these three to switch, D, in series with binding-post, F, the terminal of the coil. Place 16-cp. lights in the receptacles and connect the fuses with a 110-volt lighting circuit. The apparatus is now ready for operation. Turn on switch, D, and the lamps, while C is open. The coil will commence to become warm, soon drying out the plaster-of-paris. To obtain more heat



Electric Furnace

open one lamp, and to obtain still more open the other and close switch C.—Contributed by Eugene Tuttle, Jr., Newark, Ohio.

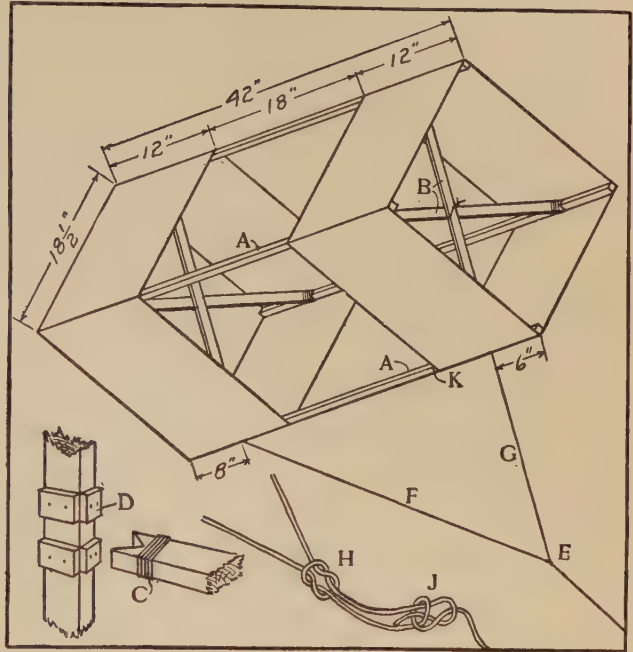
How to Make a Box Kite

As some of the readers of *Amateur Mechanics* may desire to build a box kite, a simple method of constructing one of the modern type is given in detail as follows: The sticks should be made of straight-grained wood, which may be either spruce, basswood or white pine. The longitudinal corner spines, A A, should be $\frac{3}{8}$ in. square by 42 in. long, and the four diagonal struts, B, should be $\frac{1}{4}$ in. by $\frac{1}{2}$ in., and about 26 in. long. Two cloth bands should be made to the exact dimensions given in the sketch and fastened to the four longitudinal sticks with 1-oz. tacks. It is well to mark the positions of the sticks on the cloth bands, either with a soft lead-pencil or crayon, in order to have the four sides of each band exactly equal. The ends of the bands should be lapped over at least $\frac{1}{2}$ in. and sewed double to give extra strength, and the edges should be carefully hemmed, making the width, when finished, exactly 12 in. Probably the best cloth for this purpose is nainsook, although lonsdale cambric or light-weight percaline will answer nearly as well.

The diagonal struts, B, should be cut a little too long, so that they will be slightly bowed when put in position, thus holding the cloth out taut and flat. They should be tied together at the points of intersection and the ends should be wound with coarse harnessmaker's thread, as shown at C, to prevent splitting. The small guards, D, are nailed or glued to the longitudinal sticks to prevent the struts slipping out of position. Of course the ends of the struts could be fastened to the longitudinal strips if desired, but if made as described the kite may be read-

ily taken apart and rolled up for convenience in carrying.

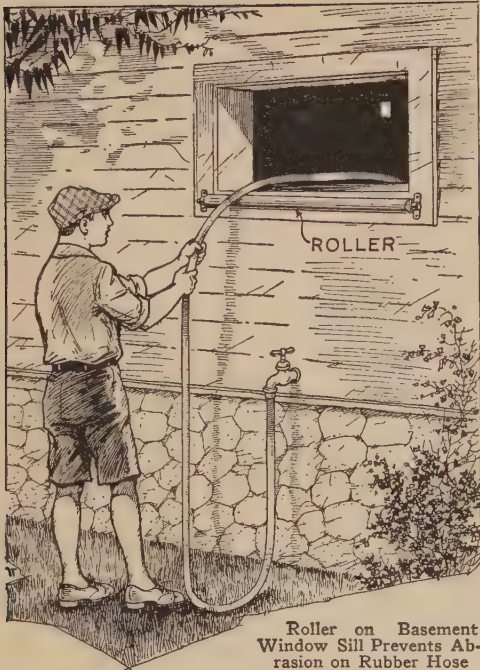
The bridle knots, E, are shown in detail at H and J. H is a square knot, which may be easily loosened and



Detail of Box Kite

shifted to a different position on the bridle, thus adjusting the lengths of F and G. A bowline knot should be tied at J, as shown, to prevent slipping. If the kite is used in a light wind, loosen the square knot and shift nearer to G, thus shortening G and lengthening F, and if a strong wind is blowing, shift toward F, thereby lengthening G and making F shorter. In a very strong wind do not use the bridle, but fasten a string securely to the stick at K.—Contributed by Edw. E. Harbert, Chicago.

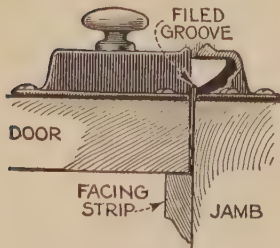
¶An experienced photographer uses blacklead for grooves about a camera or holder. A small quantity is rubbed well into the grooves and on the edges of shutters, that refuse to slide easily, with gratifying results. Care must be taken to allow no dust to settle in the holders, however.



Roller Guard Prevents Abrasion of Hose

Needless abrasion of rubber or fabric hose, caused by dragging it through basement windows or other openings in buildings, can be avoided by means of rollers, which are made by slipping a piece of ordinary iron pipe over a rod, and are mounted both inside and outside the window, and projecting a little above the sills. If the construction of the opening through the building permits, the bar can be set in two drilled holes, while, if only a window-casing edge is available for supporting the roller, the ends of the center rod can be held by U-shaped clamps.

Burglar-Proof Night Latch



It is possible to pry a sharp blade between the edge of a door and the jamb and open a night latch, but this will be impossible if a groove is filed

across the edge of the tongue, as shown in the drawing. Should anyone attempt

to insert a knife, the point will catch in the groove and the tongue cannot be pushed back. Besides doing this, it is advisable to provide strips of sheet metal on the edge of the door and jamb to prevent the wood from being cut away at this point by thieves bent on gaining entrance.—Thos. H. Duffy, Juniata, Pa.

Emergency Clock Key

Having broken a clock key, an autoist took an old inner tube valve and made a new one. The U-piece and nut were left on to serve as a handle, but the core was taken out. The square, pointed end of a file was driven into the open end, until it was expanded to fit the winding stem. Skate keys can also be made in the same way.—Arthur Flinner, Manhattan, Kans.

Handy Chimney Ladder

It is often difficult to reach high chimneys and in case of a chimney fire this may lead to serious consequences. With this in mind, the caretaker of a church at Missouri Valley, Iowa, made a special ladder, which he bolted to the chimney. This installation is handy, as the chimney is of considerable height and the roof so steep that an ordinary ladder could hardly be used, especially during winter when the roof is frequently covered with snow and ice.



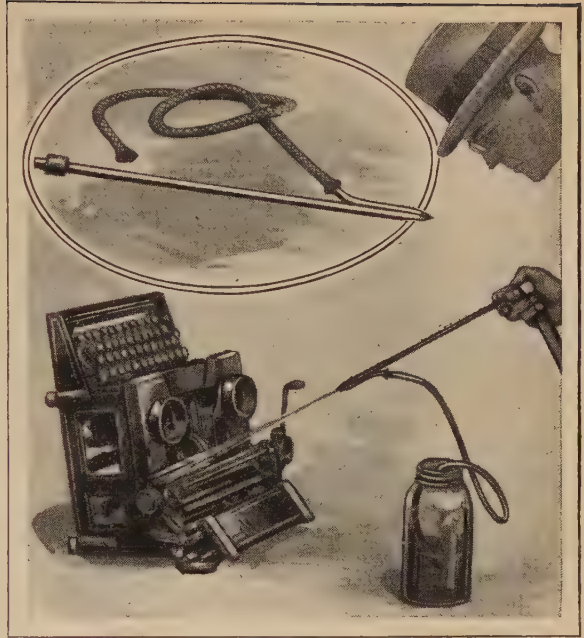
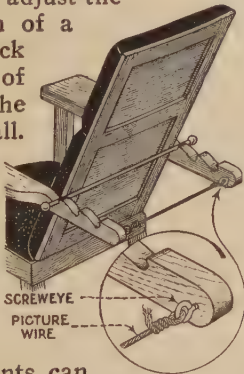
Homemade Fire Extinguisher

A thoroughly dependable fire extinguisher can be made at little cost. Get a small acetylene-gas tank, such as is used to supply illumination for motorcycles. Remove the valve and gauge from the ends of the tank, then, with a rather stiff wire, bent to form a hook at one end, fish out the asbestos filler. This may seem a tedious job but keep at it until you are sure every crumb is dislodged. A power-

ful stream of water from a hose often will wash away large pieces. When the cylinder is thoroughly clean, get a large valve from a discarded inner tube and thread the stem to fit the end from which the pressure gauge was removed. Into the other end, screw an ordinary brass valve of the type used to drain water from automobile radiators, and, if you wish, a short length of copper or brass tubing may be soldered on to this for a nozzle. Make sure that the tank is air-tight, then buy a 5-lb. can of carbon tetrachloride from the druggist, and pour the contents into the prepared cylinder. Any of the standard preparations sold to refill fire extinguishers may be used; you will find carbon tetrachloride an excellent substitute. Then go to an auto-service station and pump the tank up to the highest pressure the service station compressor is set for. You need have no fear about doing this, as the tank is tested for 250-lb. pressure, so it will easily stand up to 100 pounds.—Walter Briggs, Poughkeepsie, N. Y.

Safety Stop on Morris-Chair Back Rest

Often, when it is least expected, the rod which is used to adjust the angle of inclination of a Morris-chair back rest, will slip out of its notch, letting the back of the chair fall. This not only mars the furniture, but may cause injury to the person who is about to seat himself in the chair. A safety stop to prevent such accidents can be made by putting a screw-eye in the end of each rest support and stretching a piece of doubled picture wire between them, as shown in the illustration.—K. M. Coggeshall, Webster Groves, Mo.



Quick Method of Cleaning Typewriter with Compressed-Air Spray Outfit and High-Test Gasoline

Spray for Cleaning the Typewriter

With the homemade apparatus shown in the photo a typewriter may be cleaned and dried in half an hour. A 12-in. length of $\frac{1}{8}$ -in. copper tubing is flattened at one end, and a 5-in. piece, similarly flattened, is bent to form a blunt curve. The latter piece is soldered to the former, as shown in the detail, to form a double jet. A length of rubber tubing is pushed over the end of the short piece and the other end of the tubing is submerged in a jar containing high-test gasoline or other cleaning fluid. Attach the end of the other tube to a compressed-air line at a garage. The strong spray will clean the typewriter quickly. After cleaning, the tube is removed and the air is used for drying. As gasoline fumes are highly inflammable one should keep away from any open flame while doing the cleaning.—Warren E. Crabtree, Milton, Oreg.

☐ Razor straps should be scraped and cleaned every month or so, to keep the leather from filling up with dirt; put a little soap suds on the strap when using it, to get good results.

Tool for Removing Lamps from Ceiling Fixtures

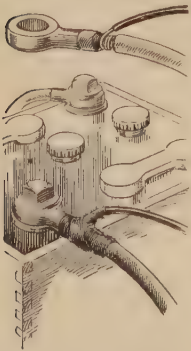


When putting new lamps into fixtures attached to the ceiling, a step-ladder is usually necessary. However, by rigging up the simple device shown in the drawing, the lamps can easily be removed and replaced from the floor.

It consists of a 5-ft. stick, to the end of which is attached a piece of corrugated cardboard, formed into a cylinder the inside diameter of which is a trifle less than the diameter of the lamp. To strengthen the holder it may be bound with tape. A few carpet tacks are used to fasten it securely to the end of the stick. In use, the holder is pushed over the lamp to grip it firmly and by turning the stick the lamp can readily be put in or removed.—Henry J. Smith, Montreal, Can.

Wiring Accessories to Storage Battery

Frequently when connecting spotlights, horns, stop signals and other electrical devices to the storage battery of a car, the wire is brought under the terminal nut of the battery. This method is, however, rather unsatisfactory as the small wire soon corrodes from the action of the sulphuric acid, and each time the battery is disconnected it is also necessary to disconnect the extra lead. A more satisfactory way is shown in the illustration. The storage-battery cable is bared and the wire twisted around it and soldered. The joint is then taped and shellacked. This makes a durable and



permanent connection, which will not be affected by acid and does not interfere with the easy removal of the battery.—G. A. Luers, Washington, D. C.

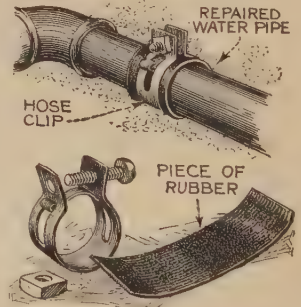
Protection for Radiator Core

Ford radiator cores, of the type used from 1917 to 1923, are often worn through on top by friction of the shell at the rear edge. It is important to keep the fabric strip, which is threaded through the rear edge of the shell, in good condition, and to replace it if it becomes hard or cut through in places. The reason for this is that the fabric keeps the shell from wearing the core and also prevents rattling and squeaking of the hood.

Repair for Water-Pipe Leak

If the water pipe springs a leak during the night or on Sunday, when plumbers are hard to locate, emergency repairs can be made with

a garden hose clip and a piece of rubber, cut from an old inner tube, as shown in the drawing. The hose clip is placed so that one of the metal strips fits over the hole, otherwise the water pressure will stretch the rubber until it bursts. Such a repair, while intended only as an emergency remedy, may last for a long time.—Ivan E. Houk, Denver, Colo.



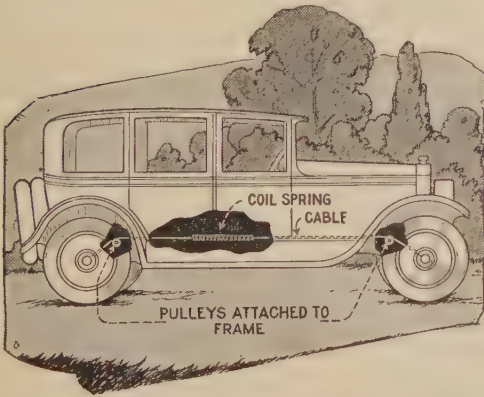
Holes for Seat-Cover Fasteners

The better grade seat covers are attached to closed cars with wood screws having ball heads for glove fasteners in the seat cover. An ordinary small twist drill should be used in drilling the small holes for starting the screws, as the screwdriver slots in the heads are too small to allow them to be driven directly into the average wood frame. There is a layer of soft filling, much like cotton batting, under the upholstery cloth, and

in starting the screws, the filling has a tendency to catch on the drill and wrap about it. This injures the upholstery and makes the screws difficult to start. The holes should be drilled with a forward and backward motion, one turn forward and a quarter turn back. The cotton will not stick to the drill and yet the drill will quickly sunk into the wood.—E. T. Gunderson, Humboldt, Iowa.

Homemade Snubbers Prove Effective in Stopping Rebound

Rebound on rough roads is the greatest cause of broken springs, and snubbers are usually provided to offset this action. If the auto owner does not feel justified in purchasing commercial snubbers, he can make some which will be found entirely satisfactory. Obtain two strong coil springs, about 12 in. long, made of $\frac{1}{4}$ -in. wire. Attach to the ends of each spring a piece of $\frac{3}{8}$ -in. steel cable, long enough to reach the front and rear axles, allowing the cable to pass over heavy pulleys attached securely to the frame, as shown in the drawing. Using cable clamps, draw the cables up so tight that the springs of the car will be slightly compressed. The coil springs should be located in the center of the car just behind the running-board apron, and care should be taken to get them in alinement. These snubbers will absorb side sways as well as the vertical rebound of the car,



Homemade Snubbers Absorb All Shocks on Rough Roads and Make Riding Comfortable

and the riding qualities of the auto will be found greatly improved.—Geo. G. McVicker, North Bend, Nebr.



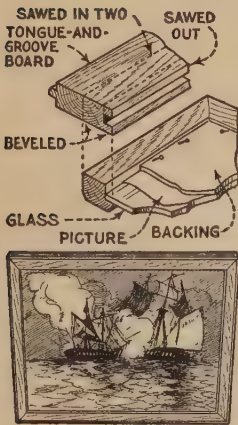
Emergency Churn for Campers Made from Inner Tube and Sirup Pail

Novel Improvised Churn

While camping out last summer, a party of fishermen found their supply of butter exhausted, and a farm house in the vicinity could only furnish a jar of sour cream. Taking this to camp, one of the party improvised a churn, which provided fresh butter in a very short time. He set the jar of cream in a near-by spring, cut a discarded inner tube at the valve section, tied one end to a low branch of a tree and stretched the tube so that the opposite end could be tied to a peg in the ground. The tube was then slit in the center to receive a $\frac{1}{2}$ -gal. sirup pail with a tight-fitting lid. A hole was punched in the cover to receive a cork and the churn was ready for use. It was operated by grasping the inner tube above the pail and pulling it up or down, and letting it rebound. The cork was removed occasionally to allow the gas to escape.

Registers are hard to clean with ordinary brooms, or the like, and a good method of cleaning them is to use stove polish on a rag; this enables you to reach the corners and do a good job.

Making Picture Frames

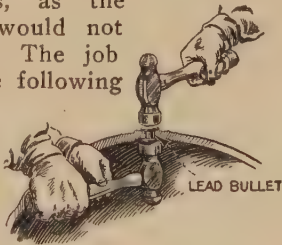


Very good picture frames can be made from tongue-and-grooved lumber. Saw the lumber the desired width, measuring from the grooved edge. Cut away one side of the groove. Then plane the surfaces and finish with fine sandpaper. This gives a stock of picture-frame

molding from which attractive frames can readily be made.

Leaks Stopped with Bullets

Recently an open-top water tank sprung a leak where the iron had been eaten away by rust. I tried soldering, but without success, as the rusted surface would not take the solder. The job was done in the following way: A lead bullet from a .32-caliber cartridge was inserted into the hole, which was enlarged to receive it. A hammer head was held against the bullet on the inside of the tank and the portion of it protruding on the outside was peened over with a riveting hammer as shown in the illustration. The repair shows promise of being a permanent one.—C. M. Wilcox, Torrington, Conn.



Fire Hazard in Climbing Vines

When vines are allowed to cover a chimney, which leads from a fireplace and touches a shingle roof, there is danger of fire. The vines, some of which become very dry, are easily set afire by a spark, and in one case the blaze spread to the roof. The result was that one side was damaged to such an extent it

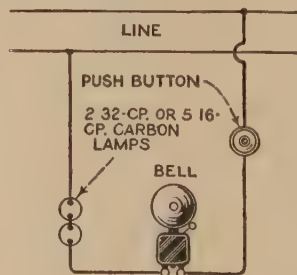
had to be entirely replaced and much more damage was caused by water. The vines should be trimmed every year and all the dry, dead branches should be cut off to reduce the fire hazard, and not allowed to climb to the top of the chimney.—John E. Mason, Hamilton, Ont.

Loose Coil Bridge Causes Spark Miss

My Ford occasioned some trouble because of a persistent miss that could not be located. The timer was examined; the plugs, coils and wiring and everything were found to be in good condition. The compression was good and the valves were reground to insure proper seating, but this did not cure the skip. One mechanic noticed that the coil bridges were loose due to improperly tightened nuts and, of course, this did not permit a positive connection. As soon as these were tightened the car operated normally.—Glen F. Stillwell, Collinsville, Ill.

Hookup for Using Doorbells on 110-Volt Lines

When a doorbell is to be operated on a 110-volt light line, it can be done by connecting two 32-cp. lamps in series with the bell and the push button, as shown in the accompanying diagram. Another way is to use only one 16-cp. lamp instead of two and bridge the two terminals of the bell with a 6 or 7-ohm resistance, an ordinary radio rheostat of this capacity or any fixed resistance being suitable for this purpose. A resistance of



about 7 ohms can be obtained by winding about 25 ft. of No. 21 German-silver wire on a piece of fiber or bakelite taking care that no two

of the turns touch. The ordinary doorbell will stand .1 amp. and requires 2 volts' pressure. So five 16-cp. lamps, which have a resistance of 220-ohms each, will bring 110 volts down to 2 volts and .1 ampere.



How to Make a Camp Baker

By C. P. FORDYCE

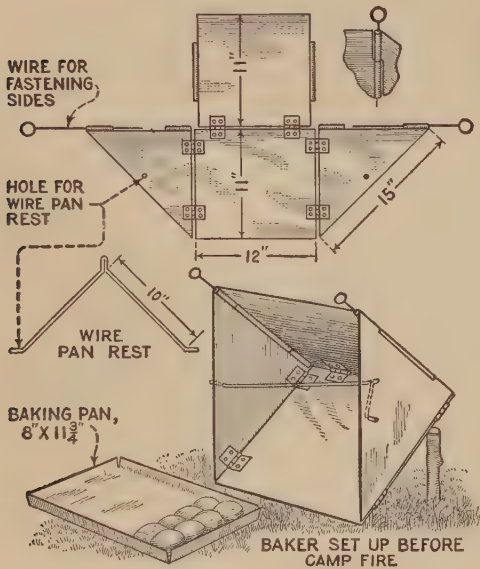
ONE mark of the efficient camp craftsman is that he be able to make good meals from scanty food supplies. Perhaps nothing is so trying as to attempt to make good breads with the limited utensils at hand. In the north woods the reflecting baker of aluminum or light tin is the most popular style for all kinds of baking and roasting. It consists of two flat metal surfaces set at an angle with ends closed to hold the heat, and with

the flare or open front before the leaping flames of a camp fire; in the center of this angular unit is set the bake tin with its batter or dough. The heat from the camp fire hits the polished flat upper surface and is thrown down upon the top of the breadstuff and from the lower up against the bottom of the bake tin. Being of thin-gauge sheet metal and folding flat, the reflecting baker weighs but a few ounces and is easily carried in the pack.



How the Reflecting Baker Is Used; Note the High Fire and the Back-Log Reflector, and How the Baker Is Supported to Throw the Heat against Both Sides of the Pan

You can make one of these bakers at home and for this you will need a piece



Details of Construction of the Reflecting Camp Baker and the Baking Pan

of tin, 12 in. wide and 33 in. long; half a dozen small hinges, a pair of tinners' shears and a punch, two dozen tinners' rivets and a hammer. Cut the tin into three rectangles, 12 by 11 in. on the side, and use two to make the top and bottom of the reflector. They are hinged together so that they will fold like the covers of a book. The sides are made by cutting the third piece of tin diagonally across, producing two triangular sections, which are both hinged to the bottom piece of the baker. Lugs are formed on these, and on the top piece, as shown, to take a piece of wire that locks the baker when open. Near the center of the sides punch holes for inserting the ends of the wire pan rest. When you wish to use the baker, drive two small stakes into the ground and rest the rear edge of the baker on them. The bake pan can be made of another piece of tin if not purchased; the dimensions are from 8 by 10 in. to 8 by 11¾ in.

The special points about the fire for the reflector are that it must be built high and preferably with a back log reflector. A low fire burns the lower side of the biscuits before the upper side browns. The best woods to use are hickory, hard maple, oak and birch. Later these will

burn down to a fine set of coals which can be utilized for another cooking. The regulation of the heat is done by moving the baker to or from the fire and by laying a green log on the ground before the tops of the biscuits are done. The secret of success of the camp baker is the envelope of hot air, which must not be too hot and which must be kept even. Practically all of the commoner recipes in baking and roasting can be used.

"Digging" Worms with Electricity

On a recent fishing trip, I found it difficult to get worms, so I took two electric-lighting wires of opposite polarity and connected each one to a screwdriver to make good contact with the shank. These I stuck into the ground about 4 or 6 ft. apart and then turned the current on. In a short time, the worms came to the surface so that they could be picked up.—E. W. Carroll, Portland, Oreg.

Combination Lamp and Picture Frame

Novelty lamps of various designs are quite popular nowadays, and the one shown in the photo will perhaps strike your fancy. It is a dresser lamp and serves the additional purpose of holding a photo. It consists of a base and two standards, on the end of which miniature sockets are mounted for lamps of the design indicated. The standards are drilled lengthwise to accommodate the lampcord, which leads to each socket, these being connected in parallel in the base, which is drilled for that purpose. The connections should be well soldered and taped. The picture frame is pivoted between the standards.—B. J. Jakaitis, Chicago, Ill.

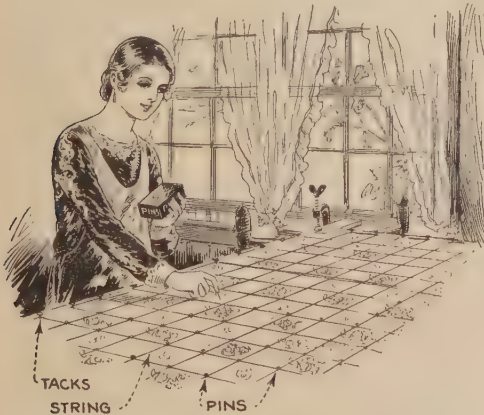


Lock for Ford Coupe

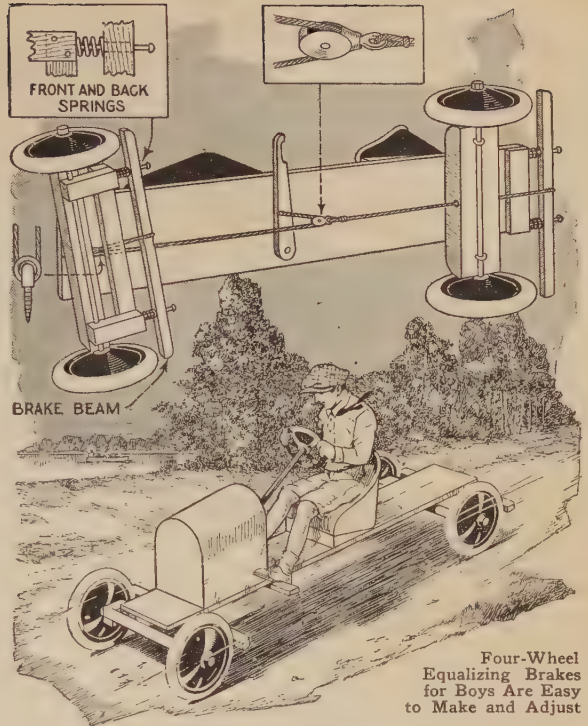
To prevent thieves from stealing things from the rear end of his Ford coupe, one owner put on a latch which could only be opened from the inside of the car. After the latch is closed and the doors are locked, the rear end cannot be opened unless pried. A small wire leads from the latch to the left side of the cushion and fastens to a ring, which prevents it from slipping back and also serves as a handle. When the wire is pulled the latch is released. To make it work automatically, a spring in the latch pushes it back again and locks the rear end as soon as the wire is let go.—R. E. McNatt, Beaumont, Tex.

Locating Knots on Quilts

In making comforters, the work of locating the various equidistant points where knots are sewed on, can be simplified by using string as shown in the illustration. The length and width of the quilt are divided into equal spaces along the supporting frame and tacks inserted at each mark. Twine or yarn is strung across the quilt from tack to tack to weave a sort of lattice and pins are inserted through the quilt at each intersection. The string and tacks are then removed and the work of tying may be accomplished in a short time.—G. E. Hendrickson, Argyle, Wis.



Simple Method of Locating Correct Position of Knots on Quilts or Comforters



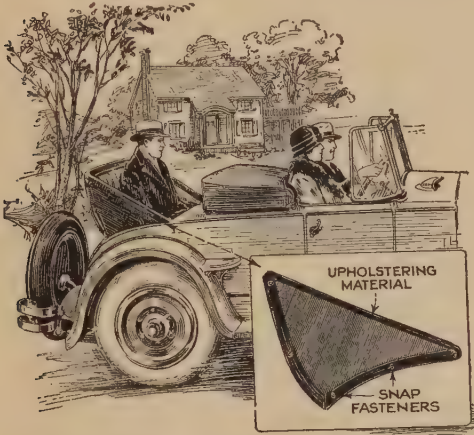
Four-Wheel Brake on Boy's Coaster

Boys who make their own coasters will find it useful and interesting to provide a four-wheel equalizing brake as shown in the drawing. It consists of two crosspieces attached to a specially made wooden frame by means of steel bolts. Small coil springs are slipped over the bolts, between the crosspieces and the frame, to keep the former from touching the wheels when the brake is not applied. Both the front and the rear crosspiece are provided with a length of sash cord, one being run through pulleys and attached to a foot lever and the other fastened to the eye of the central pulley, as shown clearly in the details of the illustration. By forward pressure on the lever, which is pivoted to the underside of the car, the brakes are applied.—Hi Sibley, Los Angeles, Calif.

Two shotgun shells, one of 12-gauge and the other of the 16-gauge size, make a neat and useful matchbox for the huntsman; the larger shell fits snugly over the smaller one, making the box practically waterproof.

Side Guards Improve Tonneau Seat

Tonneau seats, which are used on a large number of roadsters, can be improved by the provision of side guards. These are



Triangular Pieces of Upholstering Material Fitted with Snap Fasteners Improve Tonneau Seat

simply triangular pieces of top covering, or upholstering material, edged and provided with eyelets to fit snap or turn-type fasteners which are driven into the seat. Besides helping to keep out dust and draft, they add to the appearance of the tonneau seat.—G. A. Luers, Washington, D. C.

How to Calk a Small Boat

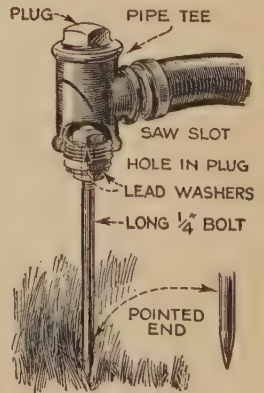
Wooden boats are prevented from excessive leaking by calking between the planking. This consists in driving in some suitable material between the planks so that it will be held firmly by the swelling wood and will close the seam to make it water-tight. The paint later applied also acts as a binder. In calking, the first operation is to smooth off the outside of the hull with the plane and sandpaper; then prepare the calking material, either oakum or spun cotton. Pull out and lightly twist enough of the material to lay in a few feet of the seam. Then, with a calking tool, drive in the material by placing the edge of the tool on the material and tapping the handle with a hammer. Drive it in well but not hard enough to spring the planking or split it on the inside. If the seam is narrow, it may be necessary to lubricate the calking material slightly with graphite. If the seam is too

tight, open it with a chisel. One seam should be finished before commencing the next, and no calking material left projecting above the surface of the hull. When the calking is done, the hull should again be gone over with a small block plane to remove all the rough spots and then sandpapered. For boats that are to be painted, the sandpaper can be rubbed crossways of as well as with the grain, but for boats that are to receive a varnish finish the sandpaper should be rubbed only with the grain. First use the rough grade and then the fine. The priming coat of paint should be applied well into the seams to bind the calking material to the wood and prevent it from "spitting" out. When the final coats are applied, the seams will be well covered so that they are invisible. In calking old boats, be careful not to start the planking by too severe use of the calking iron and do not chip off the soft edges of the wood. Cotton soaked in linseed oil makes a slightly better job as the oil fills the pores of the wood and binds the cotton to it. An old hull should be dried out for several hours before calking it.

Simply Constructed Lawn Sprayer

A simple and practical lawn sprayer, consisting of a gaspipe tee, two plugs and a carriage bolt, can be made in a few minutes. One of the plugs is drilled to receive a $\frac{1}{4}$ -in. carriage bolt, 10 in. long, and from this bolt the head is clipped and the shank filed to a sharp point, as indicated. A rubber or lead washer is used in assembling the bolt and plug to make a watertight joint. The plugs are screwed into the tee after an angular slot has been sawed in the latter, as shown.

With the hose attached and the sharpened bolt inserted into the ground, the sprayer is ready for use and, in operation, will provide the wide mistlike spray so desired for the watering of lawns and gardens.





Novel Aerial Trolley for Diving into Small Streams Where Shallow Water Prevents the Practice of Diving from the Banks

Trolley for Bathers

If you go swimming in a narrow river where it is impossible to dive from the banks, rig up a trolley over the stream, as shown in the illustration. A strong rope is securely tied to a tree on each bank, one end higher than the other. The trolley consists of a piece of 2 by 4-in. stock to which two wooden pulleys are attached by means of U-shaped hangers. An ordinary bolt is slipped through holes

drilled in the end of these and washers are placed between the sides of the hangers and the pulleys. A rope handle is provided for the rider, being fastened to the trolley as shown, and a long rope is tied to the latter so that it can be pulled back to the starting position. The rope should be coiled to prevent it from being tangled when the trolley takes off.—Dale R. Van Horn, Lincoln, Nebr.

Simple Repair for Leaky Drain Pipe

Many small repair jobs around the house can be done with cement. A leaky drain pipe from a kitchen sink was fixed by this means. In this instance the lead pipe, which ran down through the floor, had broken loose where it was joined to the cast-iron pipe and also had a hole, about $\frac{3}{4}$ in. in diameter. Narrow strips of cloth, soaked in a thin mixture of cement and water, were wound around the joint. A

few turns of some light wire around the cloth served to reinforce it, and another layer of cloth and wire was applied for good measure. This repair has lasted for over two years and it still remains in perfect condition.—J. H. Edwards, Huntington, W. Va.

☞ To remove a cork from a bottle drive a screweye into it, and if the bottle has to be uncorked frequently, leave the screweye in the cork.



Homemade Ejector Attached to Water System Lightens Labor on Wash Days

Ejector for Emptying Washtubs

Carrying tubs of water is a difficult task and emptying them by buckets takes time. This work can be eliminated by using the ejector shown in the drawing, which acts as a siphon. Run a length of $\frac{3}{4}$ -in. pipe from the water main down the wall, vertically, and fit a valve on the end. A short nipple is screwed into the valve, a Y-fitting is added and then another length of pipe, which leads to the drain. A short nipple is screwed into the Y-fitting and a length of hose is attached as shown. The Y-fitting should be lower than the bottom of the tub when standing on a bench, in order to make the ejector work effectively. When a tub is to be emptied, place the end of the hose in the tub near the bottom and turn on the valve. The rush

of water through the pipe will suck the water out of the tub. After the siphon action has started, the valve can be closed.

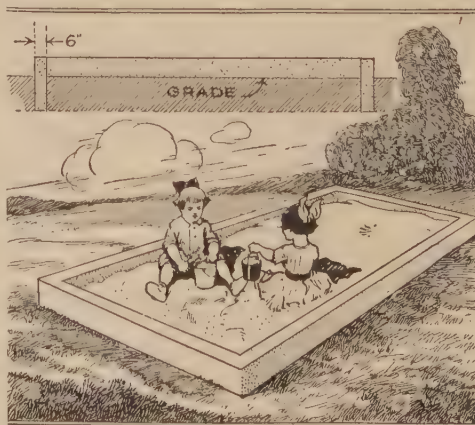
Reclaiming Old Paint

Many amateur painters have wondered why paint that has stood for a time in a can, more or less exposed to the air, creeps and crawls in spite of the best efforts in brushing it over the surface painted. This action, though troublesome, is not due to the method of handling the brush, but is due to too much exposure to the air.

What should be done is to mix the paint with benzine or gasoline and allow it to stand, after being well stirred, for a day or more. Then pour off the benzine or gasoline with the oil and add a fresh supply of linseed oil and a little more drier than would ordinarily be used.

Sand Box for Children Built of Concrete

Children's sand boxes are usually made of wood, but concrete gives a better appearance and is, of course, more durable. The box should be large enough to accommodate several children. In building one, a trench is dug to a depth of about 18 in. and wide enough to receive wooden forms made of $\frac{3}{4}$ -in. material. The stakes, which are lengths of 2 by 4-in. wood, should not be over 3 ft. apart. Care should be taken that the top of the form is level and that the inner surface is as smooth as possible. The form should be drenched before it is filled. About $1\frac{1}{4}$ cu. ft. of concrete will



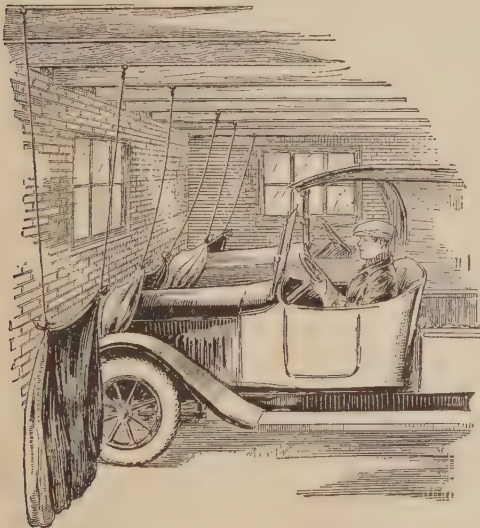
Concrete Sand Box for the Children Is Neat-Looking and Durable

be required for each running foot. A box 15 ft. long and 5 ft. wide will require $48\frac{3}{4}$ cu. ft. of concrete. The mixture is made in the proportion of 1 sack, or 1 cu. ft., of cement to $2\frac{1}{2}$ of sand and 4 of pebbles, ranging from $\frac{1}{4}$ in. to 1 in. in diameter. All told, about 10 sacks of cement, 25 cu. ft. of sand and 40 cu. ft. of pebbles will be required. The next

day after the form is filled it may be removed and the surface of the wall troweled with a small amount of cement and sand in the proportion of 1 to 2. Before the mortar has hardened, the entire surface should be painted with a well-stirred mixture of cement and water of a creamy consistency, which may be applied with an old paintbrush. The wall should be kept damp for several days and may be covered with wet burlap, straw or building paper to protect it from the sun. The sand box is filled, to a depth of 9 to 18 in., with clean, white sand in which children will enjoy playing. A concrete floor is not necessary, but if desired, provision should be made for draining it.—A. J. R. Curtis, Chicago, Ill.

Auto Radiator Automatically Blanketed

A Wisconsin merchant who keeps several delivery cars in a small, unheated garage at the rear of his store, found that, while the blanketing of the radiators between trips preserved the heat of the engines so that the starting was made easier and required less fuel, the crowded park-

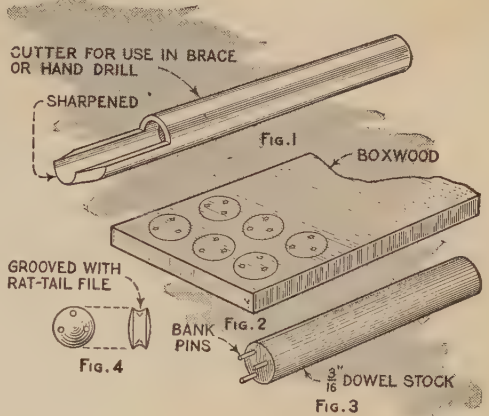


Blankets Hanging in Garage Automatically Drop Down and Cover Auto Hoods

ing space in the building made the task rather difficult, and the drivers often neglected it. To overcome the trouble, blankets are hung from the ceiling, so that, when a car is driven into its space, they automatically cover the radiator and front.

Making Deadeyes for Ship Models

One of the jobs that daunts the amateur ship modeler is the making of the numer-



ous deadeyes required for the standing rigging. With a couple of simple tools, however, this job can be robbed of its terrors, and enough deadeyes for the average ship can be made in a single evening.

The first tool is made of a short length of $\frac{1}{4}$ -in. drill rod; a $\frac{3}{16}$ -in. hole is drilled along the axis, as shown in Fig. 1, and the end is then ground to the shape shown, and sharpened to a good edge on the oil-stone. The deadeyes are made of boxwood, old scales or rules providing the material, and they are marked on the wood, as indicated in Fig. 2, using a light hammer to outline the circles with the tool. The next step is to drill the holes for the lanyards, and, in doing this, be sure to lay out and drill the holes as shown in Fig. 4. The tool is now mounted in the brace or hand drill and the deadeyes cut out.

The next tool is a short length of $\frac{3}{16}$ -in. dowel stock, Fig. 3, into the end of which has been driven three bank pins, spaced so as to fit the holes in the deadeyes, and cut off so that they do not project through the latter. With a deadeye mounted on the end of this tool it is easy to sand the curve on the face and to cut the groove around the edge, using a rat-tail or a triangular file for the latter operation.—L. E. Davis, Syracuse, N. Y.

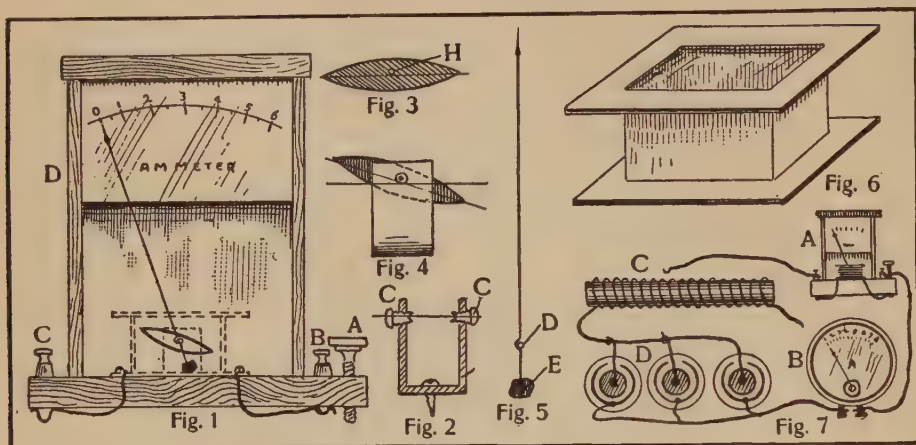
☛ Scorch marks on linen may be removed by rubbing with a freshly cut onion and afterward soaking in cold water.

How to Make an Ammeter

Every amateur mechanic who performs electrical experiments will find use for an ammeter, and for the benefit of those who wish to construct such an instrument the following description is given: The operative principle

ness of the instrument depends on the ease with which this axle turns.

After assembling the core as shown in Fig. 4, it should be filed a little at one end until it assumes the position indicated. The pointer or hand, Fig. 5, is made of wire, aluminum being



Complete Ammeter and Details

of this instrument is the same as that of a galvanometer, except that its working position is not confined to the magnetic meridian. This is accomplished by making the needle revolve in a vertical instead of a horizontal plane. The only adjustment necessary is that of leveling, which is accomplished by turning the thumb-screw shown at A, Fig. 1, until the hand points to zero on the scale.

First make a support, Fig. 2, by bending a piece of sheet brass to the shape indicated and tapping for the screws CC. These should have hollow ends, as shown, for the purpose of receiving the pivoted axle which supports the hand. The core, Fig. 3, is made of iron. It is 1 in. long, $\frac{1}{4}$ in. wide and $\frac{1}{8}$ in. thick. At a point a little above the center, drill a hole as shown at H, and through this hole drive a piece of knitting-needle about $\frac{1}{2}$ in. long, or long enough to reach between the two screws shown in Fig. 2. The ends of this small axle should be ground pointed and should turn easily in the cavities, as the sensitive-

preferable for this purpose, although copper or steel will do. Make the wire $4\frac{1}{2}$ in. long and make a loop, D, $\frac{1}{2}$ in. from the lower end. Solder to the short end a piece of brass, E, of such weight that it will exactly balance the weight of the hand. This is slipped on the pivot, and the whole thing is again placed in position in the support. If the pointer is correctly balanced it should take the position shown in Fig. 1, but if it is not exactly right a little filing will bring it near enough so that it may be corrected by the adjusting-screw.

Next make a brass frame as shown in Fig. 6. This may be made of wood, although brass is better, as the eddy currents set up in a conductor surrounding a magnet tend to stop oscillation of the magnet. (The core is magnetized when a current flows through the instrument.) The brass frame is wound with magnet wire, the size depending on the number of amperes to be measured. Mine is wound with two layers of No. 14 wire, 10 turns to each layer, and is about right

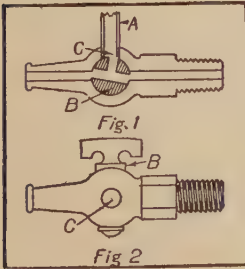
for ordinary experimental purposes. The ends of the wire are fastened to the binding posts B and C, Fig. 1.

A wooden box, D, is then made and provided with a glass front. A piece of paper is pasted on a piece of wood, which is then fastened in the box in such a position that the hand or pointer will lie close to the paper scale. The box is $5\frac{1}{2}$ in. high, 4 in. wide and $1\frac{3}{4}$ in. deep, inside measurements. After everything is assembled put a drop of solder on the loop at D, Fig. 5, to prevent it turning on the axle.

To calibrate the instrument connect as shown in Fig. 7, where A is the homemade ammeter; B, a standard ammeter; C, a variable resistance, and D, a battery, consisting of three or more cells connected in multiple. Throw in enough resistance to make the standard instrument read 1 ohm and then put a mark on the paper scale of the instrument to be calibrated. Continue in this way with 2 amperes, 3 amperes, 4 amperes, etc., until the scale is full. To make a voltmeter out of this instrument, wind with plenty of No. 36 magnet wire instead of No. 14, or if it is desired to make an instrument for measuring both volts and amperes, use both windings and connect to two pairs of binding posts.—Contributed by J. E. Dussault, Montreal.

How to Make a Three-Way Cock for Small Model-Work

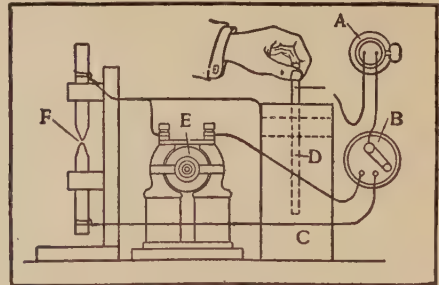
In making models of machines it is often necessary to contrive some method for a 3- or 4-way valve or cock. To make one, secure a pet cock and drill and tap hole through, as shown in the cut. If for 3-way, drill in only to the opening already through, but if for a 4-way, drill through the entire case and valve. Be



sure to have valve B turned so as to drill at right angles to the opening through it. After drilling, remove the valve, take off the burr with a piece of emery paper and replace ready for work.

Easy Experiments with Electric-Light Circuit

An electric-light circuit will be found much less expensive than batteries for performing electrical experiments. The sketch shows how a small arc light and motor may be connected to the light socket, A. The light is removed and a plug with wire connections is put in its place. One wire runs to the switch, B, and the other connects with the water rheostat, which is used for reducing the current.



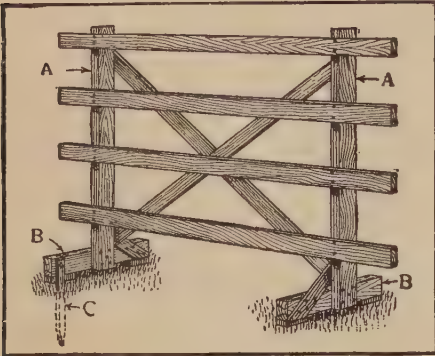
Arc-Light Motor and Water Rheostat

A tin can, C, is filled nearly to the top with salt water, and a metal rod, D, is passed through a piece of wood fastened at the top of the can. When the metal rod is lowered the current increases, and as it is withdrawn the current grows weaker. In this way the desired amount of current can be obtained.

By connecting the motor, E, and the arc light, F, as shown, either one may be operated by turning switch B to the corresponding point. The arc light is easily made by fastening two electric-light carbons in a wooden frame like that shown. To start the light, turn the current on strong and bring the points of the carbons together; then separate slightly by twisting the upper carbon and at the same time drawing it through the hole.

How to Build a Grape Arbor

A grape arbor made of white pine, put together as shown in the sketch, will last for several years. The 2 by



Grape-Arbor Trellis

4-in. posts, A, are 7 ft. long. The feet, B, are made 2 by 4 in., 4 ft. long, and rest on a brick placed under each end.

How to Make a Toy Steam Engine

A toy engine can be easily made from old implements which can be found in nearly every house.

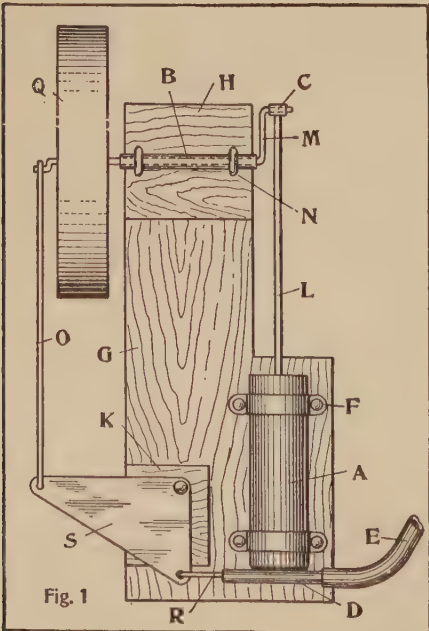


Fig. 1

Toy Steam Engine Assembled

The cylinder A, Fig. 1, is an old bicycle pump, cut in half. The steam chest D, is part of the piston tube of the same pump, the other parts being used for the bearing B, and the crank bearing C. The flywheel Q can be any small-sized iron wheel; either an old sewing-machine wheel, pulley wheel, or anything available. We used a wheel from an old high chair for our engine. If the bore in the wheel is too large for the shaft, it may be bushed with a piece of hard wood. The shaft is made of heavy steel wire, the size of the hole in the bearing B.

The base is made of wood, and has two wood blocks, H and K, $\frac{3}{8}$ in. thick,

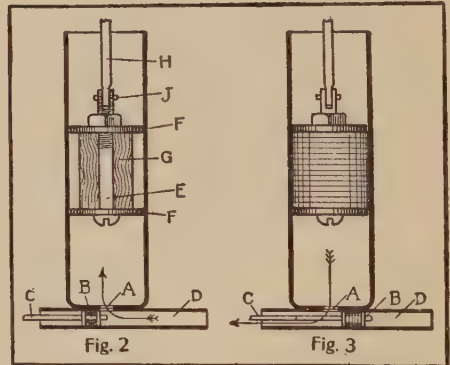


Fig. 2

Fig. 3

Valve Motion and Construction of Piston

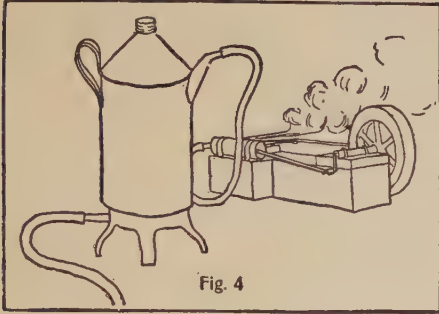
to support bearing B, and valve crank S, which is made of tin. The hose E connects to the boiler, which will be described later. The clips F F are soldered to the cylinder and nailed to the base, and the bearing B is fastened by staples.

The valve motion is shown in Figs. 2 and 3. In Fig. 2 the steam is entering the cylinder, and in Fig. 3 the valve B has closed the steam inlet and opened the exhaust, thus allowing the steam in the cylinder to escape.

The piston is made of a stove bolt, E, Fig. 2, with two washers, F F, and a cylindrical piece of hard wood, G. This is wound with soft string, as shown in Fig. 3, and saturated with thick oil. A slot is cut in the end of the bolt E, to receive the connecting rod H. The valve B is made of an old

bicycle spoke, C, with the nut cut in half and filed down as shown, the space between the two halves being filled with string and oiled.

The valve crank S, Fig. 1, is cut out of tin, or galvanized iron, and is moved



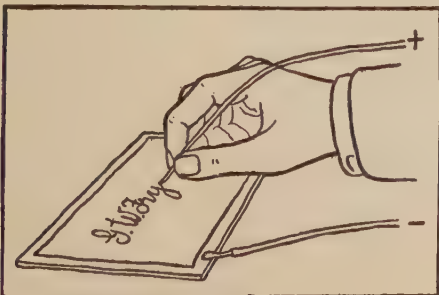
Engine in Operation

by a small crank on the shaft. This crank should be at right angles to the main crank.

The boiler, Fig. 4, can be an old oil can, powder can, or a syrup can with a tube soldered to it, and is connected to the engine by a piece of rubber tubing. The heat from a small gas stove will furnish steam fast enough to run the engine at high speed. This engine was built by W. G. Schuh and A. J. Eustice, of Cuba, Wis.

Writing with Electricity

Soak a piece of white paper in a solution of potassium iodide and water for about a minute and then lay it on a piece of sheet metal. Connect the sheet metal with the negative or zinc side of a battery and then, using the positive wire as a pen, write your name or other inscription on the wet paper.



Electrolytic Writing

The result will be brown lines on a white background.—Contributed by Geo. W. Fry, San Jose, Cal.

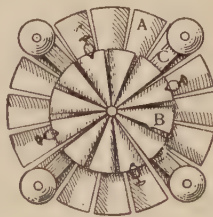
To Photograph a Man in a Bottle

Neither a huge bottle nor a dwarfed man is necessary for this process, as it is merely a trick of photography, and a very amusing trick, at that.

First, photograph the person to be inclosed in the bottle against a dark plain background and mark the exact position on the ground glass. Let the exposure be just long enough to show the figure distinctly. Then place an empty bottle against a dark background and focus so as to have the outlines of the bottle inclose those of the man. Let this exposure be about twice the length of the first, and the desired result is obtained.

A Musical Windmill

Make two wheels out of tin. They may be of any size, but wheel A must be larger than wheel B. On wheel A fasten two pieces of wood, C, to cross



in the center, and place a bell on the four ends, as shown. The smaller wheel, B, must be separated from the other with a round piece of wood or an old spool. Tie four buttons with split rings to the smaller wheel, B. The blades on the wheels should be bent opposite on one wheel from the others so as to make the wheels turn in different directions. When turning, the buttons will strike the bells and make them ring constantly.

Optical Illusions

By giving the page a revolving or rinsing motion the three circular figures printed on the next page appear to rotate. The best effect will be produced by laying the book down flat on the desk or table and revolving, first



Fig. 1

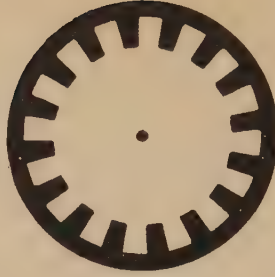


Fig. 2



Fig. 3

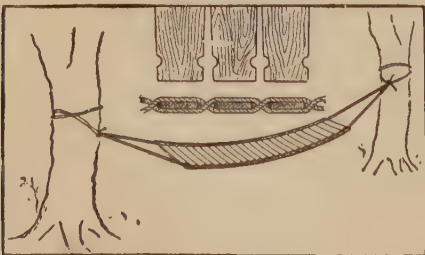
Move These Figures Rapidly with a Rinsing Motion

in one direction and then in the opposite direction, in such a way that any given point on the page will describe a circle of about $\frac{1}{2}$ in. diameter. Fig. 1 then appears to rotate in the same direction as the revolution; Fig. 2 appears to revolve in the opposite direction, and Fig. 3 appears to revolve sometimes in the same direction and at other times in the opposite direction.

A curious effect can be produced with Fig. 1 by covering up Figs. 2 and 3 with a piece of plain paper and laying a coin or other small object on the paper. If the vision is then concentrated on the coin or other object while same is being revolved, Fig. 1 will be seen to rotate.

Barrel-Stave Hammock

A hammock made of barrel staves is more comfortable than one would think, considering the nature of the material employed in making it. Good smooth staves should be selected for this purpose, and if one cares to go to a little trouble a thorough sandpapering will make a great improvement. Cut half circles out of each stave, as shown at AA, and pass ropes around



Cheap and Comfortable

the ends as shown at B. When finished the weight will then be supported by four ropes at each end, which allows the use of small-sized ropes, such as clothes lines. A hammock of this kind may be left out in the rain without injury.—Contributed by H. G. M., St. Louis, Mo.

A Singing Telephone

Those who have not already tried the experiment may be interested to know that a telephone may be made to sing by holding the receiver about $\frac{1}{16}$ in. from the transmitter, as shown in the illustration. The experiment will



To Make a Telephone Sing

work well on most telephones, but not on all.

When the receiver is placed in the position shown it acts like an ordinary buzzer, and the function of the transmitter will then be that of an interrupter. The slightest movement of the transmitter diaphragm will cause an increased movement of the receiver diaphragm. This in turn will act on the transmitter, thus setting up sympathetic vibrations between the two, which accounts for the sound.

A Square-Rigger for the Boy

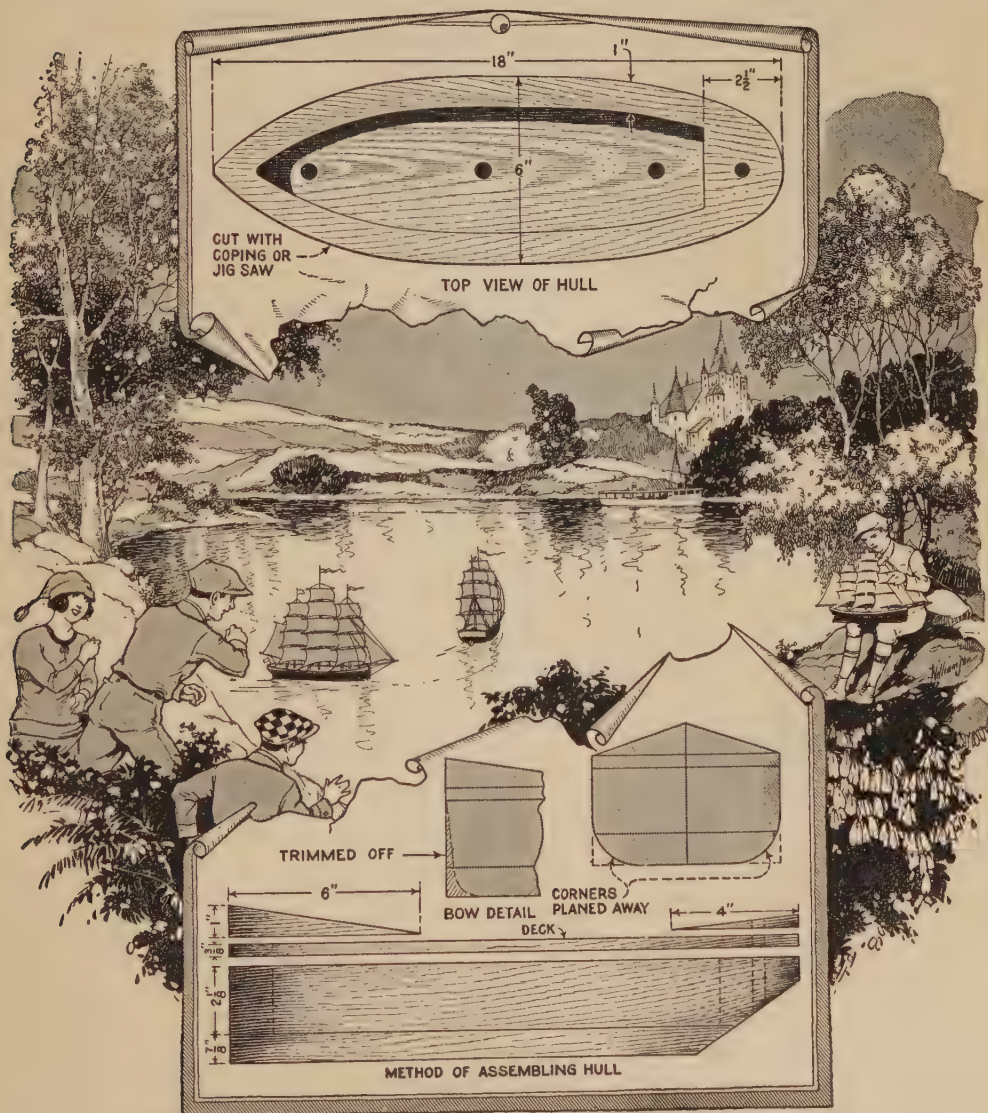
By HI SIBLEY

THE vogue for model craft which has launched ten thousand ships has left the youngsters somewhat unenthusiastic, for the reason that these picturesque little masterpieces cannot be tried out in the bathtub. "Gee, that's keen!" they say when shown a new model, and then ask, "Will it float?"

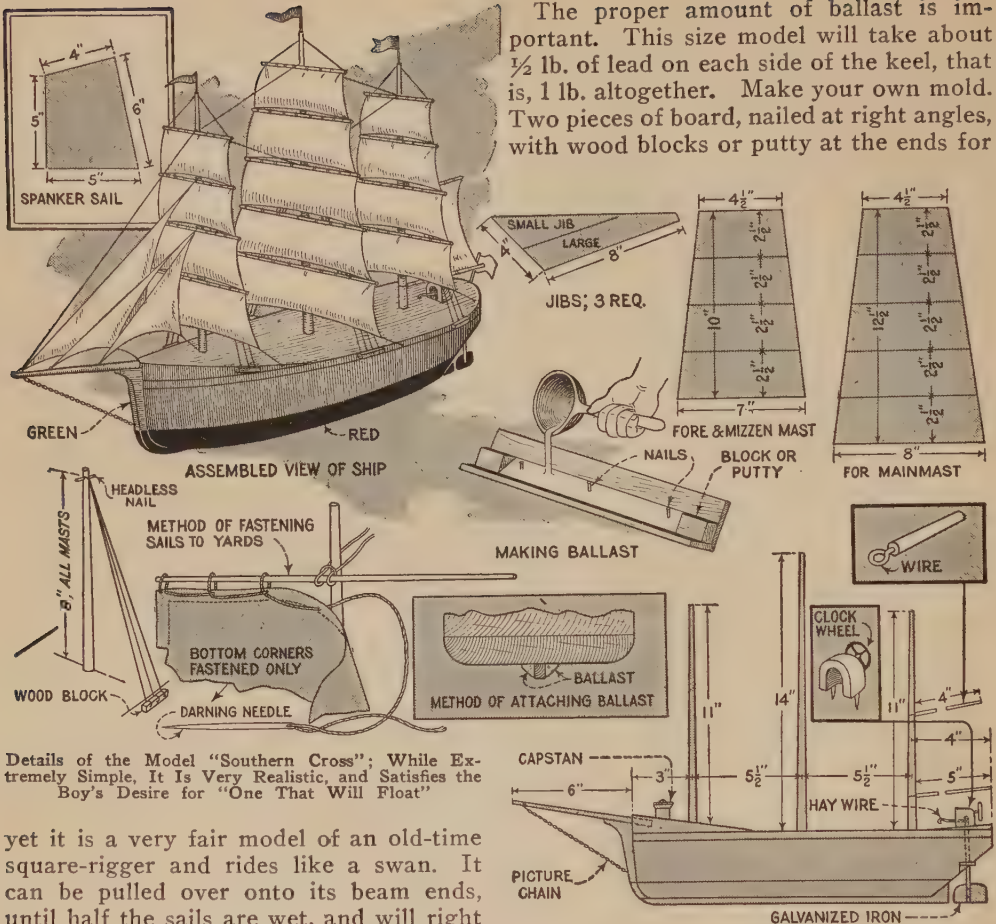
After the model shipbuilder has pa-

tiently worked for weeks on the intricate rigging and delicate trim of the "Santa Maria" or the "Half Moon," he is ready to go to the other extreme and make a simple ship.

The "Southern Cross," here illustrated, combines extreme simplicity with great seaworthiness. There is not a single unnecessary item in its entire construction,



Here is an Easily Made Model of a Square-Rigger That Will Really Sail, and That Will Provide Endless Amusement for Any Boy



Details of the Model "Southern Cross"; While Extremely Simple, It Is Very Realistic, and Satisfies the Boy's Desire for "One That Will Float"

yet it is a very fair model of an old-time square-rigger and rides like a swan. It can be pulled over onto its beam ends, until half the sails are wet, and will right itself at once. Old salts may be somewhat amused at its queer rigging, but it must be borne in mind that the "Southern Cross" was designed for easy construction and sturdiness to stand rough usage in the hands of a hard-riding young skipper.

The hull is roughed out with a coping saw, which also is used to cut away the inside of the central block. Attach the bottom piece and deck to the central block, using glue and nails. Then round off bottom corners and stern overhang with a plane, chisel or drawknife. Next put on the wedge-shaped bow and stern pieces to give the deck the proper sheer or curve fore and aft.

The masts are made from $\frac{1}{2}$ -in. dowel sticks, tapered with a plane, and the bowsprit from $\frac{3}{8}$ -in. dowels. Bore holes for these but do not set them until after the keelboard is fitted.

The proper amount of ballast is important. This size model will take about $\frac{1}{2}$ lb. of lead on each side of the keel, that is, 1 lb. altogether. Make your own mold. Two pieces of board, nailed at right angles, with wood blocks or putty at the ends for

stops, will do nicely. Set three or four nails upright in the mold in order to make holes in the ballast pieces to fasten them to hull. The wood mold must be absolutely level when pouring from the ladle. When cold, cut the lead into two equal pieces and finish the rough edges with a file. Nail on both sides of keel, just a little back of center, in order to keep the bow higher than the stern.

For the rudder post, use about $\frac{5}{16}$ -in. dowel, and bore a $\frac{3}{8}$ -in., or larger, hole to receive it, so that it will still be loose enough when the dampness swells it. An extra item, though not necessary, is the wood cowl over the top of the rudder post, carrying a small clock gear as a dummy steering wheel. This, of course, can be left off entirely.

Yards should be cut from $\frac{1}{4}$ -in. dowel sticks, and tapered to each end with the

plane; each yard should be $\frac{1}{2}$ in. shorter than the one directly below it. Yards, masts, bowsprit and deck should be given a coat of orange shellac.

Paint the hull a bright vermilion below the water line, and green or black above. Give two coats of these colors, ground in japan, then one coat of spar varnish.

The dimensions of the sails given allow for $\frac{1}{4}$ -in. hem all around. When the sails are set and the yards slung to the masts, go over the strings with a coat of shellac to keep them in place.

Novel Method of Growing Strawberries

It would seem impossible to grow 1,500 strawberry plants properly on a plot of ground 12 by 26 ft. in dimensions. A glance at the photo shows how this has been done, however. A number of concrete blocks, 3 ft. long, 2 ft. high and 15 in. wide at the bottom, were cast, the forms being made from old dry-goods boxes. The blocks were made hollow, with a solid base. Muffin tins were attached to the outside to make the holes in the sides. The making and fitting of the forms, which were collapsible, was the most difficult part of the work, especially the inner one. When finished, the blocks were filled with dirt and the strawberry plants inserted, one in each hole. The roots were watered by pushing a broom handle down into the dirt and pouring water or fertilizer into the holes thus made. With this arrangement much more area is obtained for growing the berries, no dirt gets on them, there is no weeding to be done, and it is easy to clip the runners. To prevent birds



Growing 1,500 Strawberry Plants in a Small Backyard, in Hollow Concrete Blocks

from visiting the patch, it is an easy matter to cover the block with netting.

Grinding Juicy Substances with Food Chopper

If an ordinary food chopper is used to grind juicy substances, trouble is often ex-



Inclined Food Chopper Prevents Leakage at Handle

perienced with the juice leaking out at the crank. Screwing the chopper in an inclined position, as indicated, causes all the drainage to take place at the other end. This can be done by providing a triangular strip on the chopper and cutting a nick in the edge of the bench, or by clamping on a board which is inclined. Both alternatives are shown in the illustration.—A. Stenson, Gardena, Calif.

Filling the Auto Gas Tank

Many motorists blame gasoline for being poor when the trouble lies in the gasoline hose at the service station. The hose is often hung onto the tank with the nozzle up. Immediately after a rain the water will get into the hose and when the gasoline is poured into the auto tank the water also gets in. Many times the hose is nearly half full of rain water and the motorist is always anxious to get the amount of gas in the hose, not knowing that some of it is water. Therefore it is a good idea, when purchasing gas, to make sure that the water is run out of the hose before putting the gas into the tank.—Charles Latour, Jr., Plattsburg, N. Y.

Homemade Work Basket

Secure a cheese box about 12 in. high and 15 in. or more in diameter. It will pay you to be careful in selecting this box. Be sure to have the cover. Score the wood deeply with a carpenter's gauge inside and out $3\frac{1}{2}$ in. from the top of the box. With repeated scoring the wood will be almost cut through or in shape to finish the cut with a knife. Now you will have the box in two pieces. The lower part, $8\frac{1}{2}$ in. deep over all, we will call the basket, and the smaller part will be known as the tray.

Remove the band from the cover and cut the boards to fit in the tray flush with the lower edge, to make the bottom. Fasten with $\frac{3}{4}$ -in brads. The kind of wood used in making these boxes cracks easily and leaves a rough surface which should be well sandpapered.

The four legs are each $\frac{3}{4}$ in. square and $30\frac{1}{2}$ in. long. The tops should be beveled to keep them from splintering at the edges. With a string or tape measure, find the circumference of the tray or basket and divide this into four equal parts, arranging the lap seam on both to come midway between two of the marks. When assembling, make these seams come between the two back legs.

The tray is placed $1\frac{1}{4}$ in. from the top end and the basket $6\frac{3}{4}$ in. from the bottom end of the legs. Notch the legs at the lower point about $\frac{1}{8}$ in. deep and $1\frac{1}{4}$ in. wide to receive the band at the lower end of the basket. Fasten with $\frac{3}{4}$ -in. screws, using four to each leg, three of which are in the basket. Insert the screws from the inside of the box into the legs.

Stain the wood before putting in the

lining. If all the parts are well sandpapered, the wood will take the stain nicely. Three yards of cretonne will make a very attractive lining. Cut two sheets of cardboard to fit in the bottom of the tray and basket. Cover them with the cretonne, sewing on the back side. Cut four strips for the sides from the width of the goods $5\frac{1}{2}$ in. wide and four strips 10 in. wide. Sew them end to end and turn down one edge to a depth of 1 in. and gather it at that point,—also the lower edge when necessary. Sew on to the covered cardboards. Fasten them to the sides of the tray and basket with the smallest upholsterers' tacks. The product of your labor will be a very neat and useful piece of furniture.—Contributed by Stanley H. Packard, Boston, Mass.

A Window Display

A novel and attractive aeroplane window display can be easily made in the following manner: Each aeroplane is cut from folded paper, as shown in the sketch, and the wings bent out on the dotted lines. The folded part in the center is pasted together. Each aeroplane is fastened with a small thread from the point A as shown. A figure of an airman can be pasted to each aeroplane. One or more of the aeroplanes can be fastened in the blast of an electric fan and kept in flight the same as a kite. The fan can be concealed to make the display more real. When making the display, have the background of such



Paper Aeroplanes in Draft

a color as to conceal the small threads holding the aeroplanes.—Contributed by Frederick Hennighausen, Baltimore, Md.

How to Make a Rotary Pump

A simple rotary pump is constructed on the principle of creating a vacuum in a rubber tube and so causing water to rise to fill the vacuum. Figs. 3, 4 and 5 show all the parts needed, excepting the crank and tubing. The dimensions and description given are for a minimum pump, but a larger one could be built in proportion.

Through the center of a block of wood 4 in. square and $\frac{7}{8}$ in. thick (A, Figs. 1, 2 and 3) saw a circular opening $2\frac{7}{8}$ in. in diameter. On each side of this block cut a larger circle $3\frac{1}{4}$ in. in diameter, having the same center as the first circle (Fig. 3). Cut the last circles only $\frac{1}{4}$ in. deep, leaving the first circle in the form of a ridge or track $\frac{3}{8}$ in. wide, against which the rubber tubing, E, is compressed by wheels. Bore two $\frac{1}{4}$ -in. holes (HH, Fig. 1) from the outside of the block to the edge of the inner circle. Put the rubber tube, E, through one of these holes, pass it around the track and out through the other hole. Notice the break (S) in the track; this is necessary in order to place in position the piece holding the wheels.

Fig. 4 shows the wheel-holder, B. Make it of hard wood $3\frac{1}{8}$ in. long, 1 in. wide and a little less than $\frac{7}{8}$ in. thick, so that it will run freely between the sides (Fig. 5) when they are placed. Cut two grooves, one in each end, 1 in. deep and $\frac{1}{2}$ in. wide. In these grooves place wheels, CC, to turn on pins of stout wire. These wheels should be

$\frac{3}{4}$ in. in diameter. When placed in the holder their centers must be exactly 2 in. apart, or so arranged that the distance between the edge of the wheels

PLAN OF PUMP SIDES REMOVED

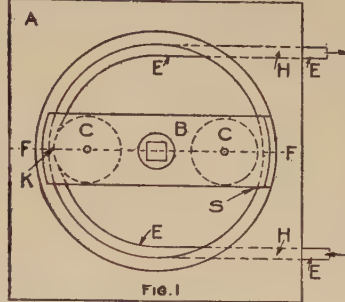


Fig. 1

TUBING PRESSED FLAT

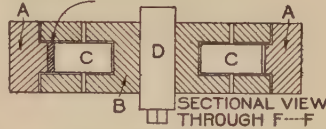


Fig. 2

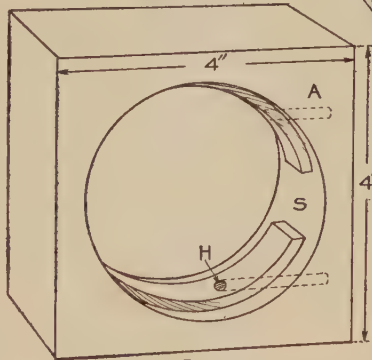


Fig. 3

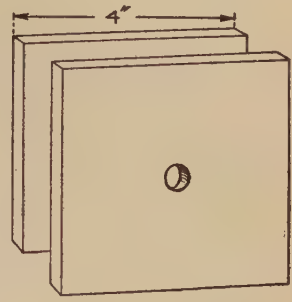


Fig. 5

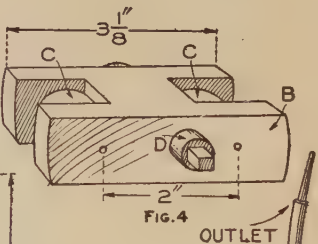


Fig. 4

OUTLET

Fig. 6

INLET

Details of Rotary Pump

and the track (K, Fig. 1) is equal to the thickness of the tubing when pressed flat. If the wheels fit too tightly, they will bind; if too loose, they will let the air through. Bore a hole through the middle of the wheel-holder and insert the crankpin, D, which should be about $\frac{1}{2}$ in. in diameter. The crankpin should fit tightly; if necessary drive a brad through to keep it from slipping.

In the sides (Fig. 5) bore a hole in the center of the crankpin to run in loosely. Now put all these parts to-

gether, as shown in the illustration. Do not fasten the sides too securely until you have tried the device and are sure it will run smoothly. For the crank a bent piece of stout wire or a nail will serve, though a small iron wheel is better, as it gives steadiness to the motion. In this case a handle must be attached to the rim of the wheel to serve as a crank. The drive wheel from a broken-down eggbeater will do nicely. For ease in handling the pump, a platform should be added.

To use the pump, fill the tube with water and place the lower end of the tube in a reservoir of water. Make a nozzle of the end of a clay pipe stem for the other end of the tube. Then turn the crank from left to right. The first wheel presses the air out of the tube, creating a vacuum which is immediately filled with water. Before the first wheel releases the tube at the top, the other wheel has reached the bottom, this time pressing along the water that was brought up by the first wheel. If the motion of the wheels is regular, the pump will give a steady stream. Two feet of $\frac{1}{4}$ -in. tubing, costing 10 cents, is all the expense necessary.—Contributed by Dan H. Hubbard, Idana, Kan.

How to Make a Fire Screen

A screen which will not interfere with the radiation of the heat from the fire, and will keep skirts and children safe can be made at little expense out of some strap iron. The screen which is shown in Fig. 1, stands 20 in. high from the base to the top cross-piece and is made of $\frac{3}{4}$ by $\frac{1}{4}$ -in. and $\frac{1}{2}$ by $\frac{1}{4}$ -in. iron. The top and bottom pieces marked AA, Fig. 1, are $\frac{3}{4}$ by $\frac{1}{4}$ in. and are 30 in. long, bent at an angle to fit the fireplace 7 in. from each end, as shown in Fig. 2. The three legs marked BBB, Fig. 1, are of the same size iron and each leg will take 34 in. of material. In shaping the feet of these three pieces give them a slight tendency to lean toward the fire or inside of screen, says

a correspondent in the Blacksmith and Wheelwright. In the two cross bars 1 in. from each end, A in Fig. 2, mark for hole and 3 in. from that mark the

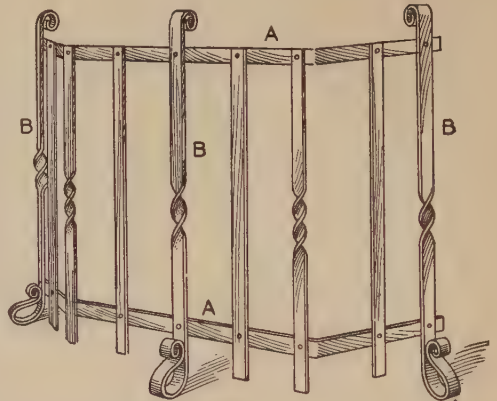


FIG. 1

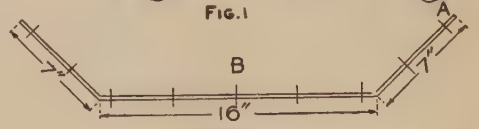


FIG. 2

Made of Strap Iron

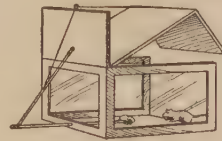
next hole. Take the center of the bar, B, 15 in. from each end, and mark for a hole, and $3\frac{1}{2}$ in. on each side mark again and $3\frac{1}{2}$ in. beyond each of these two, mark again.

Mark the legs $2\frac{3}{4}$ in. from the bottom and 2 in. from the top and after making rivet-holes rivet them to the cross bars, AA, Fig. 1.

Cut six pieces, $17\frac{1}{2}$ in. long and punch holes to fit and rivet onto the remaining holes in cross bars, AA, Fig. 1. Clean it up and give it a coat of black Japan or dead black.

Trap for Small Animals

This is a box trap with glass sides and back, the panes of glass being held in place by brads placed on both sides. The animal does not fear to enter the box, because he can see through it; when he enters, however, and touches the bait the lid is released and, dropping, shuts him in. This is one of the easiest traps to build and is usually successful.





Feeding Stations for the Birds

By BOB BECKER

AMONG winter pastimes that grow in popularity with adults and youngsters, operating a "bird cafeteria" is gradually forging to the front because of the genuine amusement the outdoor-restaurant owner enjoys. When winter comes,

our feathered friends can be induced to stay around the backyard or orchard of a suburban dwelling, or kept close to the barnyard of the farm, by the establishment of feeding stations to which the hungry birds come for food. Quite aside from the amusement feature is the great good you do when you serve a meal to them. There are times following severe ice storms when



A Chickadee Breakfasts at a Coconut, Converted into a Feeding Station and Suspended from a Tree Branch



A Weather-Vane Feeding Station Is Easily Made by Any Boy, and Provides Constant Protection for Both the Food and the Birds

a handful of grain means the difference between life and death to such a bird as the bobwhite or quail.

The simplest kind of feeding station is an inexpensive suet holder. Beef or mutton suet is the cheapest and best food for insect-eating winter birds. It does not freeze or spoil, produces a lot of heat and is nourishing. The clownish bluejay, the little black-capped chickadee who sings ever so cheerily even on the coldest days, the red-headed woodpecker, the screech owl, the nuthatch, known as the "upside-down bird," the downy woodpecker, and many other birds, are fond of ordinary suet. If you put out a few chunks of this inexpensive but highly appreciated food this winter, you will be surprised at the number of birds that will visit you daily.

You can make a suet holder at home. Take a piece of $\frac{1}{2}$ -in. netting and make a holder 6 in. wide, 8 in. high and 2 in. deep. If some of the wires at the corners stick out, so much the better. Your feathered boarders will perch on these as they get a square meal. Nail this holder to a flat board about 3 in. wide, and tack a piece of old leather, tin or a strip of rubber from an old inner tube, over it as a cover. Anything that will shed rain and snow will do.

Attach the holder to the south side of a tree. If there is a tree close to a sitting-room window, put it there, and you will have lots of fun watching the birds.

An even simpler method of bringing the birds close to you is the following: Buy a piece of suet, about one pound in weight, and tie it to a branch or to a tree trunk in your yard. If you use just one or two loops of twine the larger birds will soon make away with the lump, so it is best to crisscross the pieces several times with stout cord. If you would like to see a little winter circus with birds doing acrobatic stunts, such as standing on their heads, etc., fasten a chunk to the underside of a branch. The chickadees,

nuthatches and woodpeckers will put on a show for you when they come to it. In fact, you will see the nuthatch do all kinds of upside-down tricks as he pecks away at the suet to get a square meal.

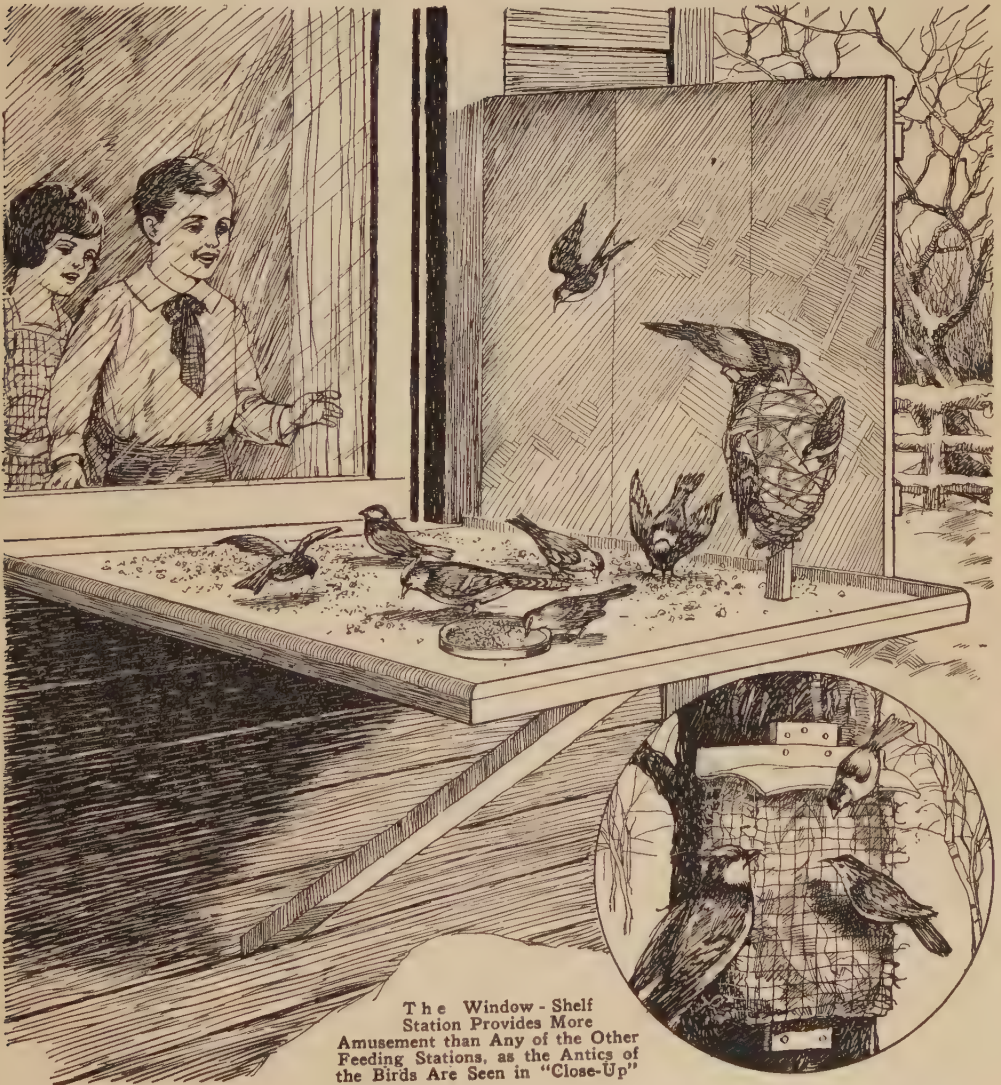
A few minutes' work some evening will make a simple yet efficient food counter for the home, one to which a number of birds usually can be attracted. One or two boards, two or more pieces of lath or old molding, a few nails and a couple of squares of old mosquito netting are needed to make this simple food shelf. Cut your boards to between 14 and 16 in. long. You will want about a 12-in. width for your shelf. To prevent strong winds from blowing the food away, tack a piece of molding or lath around its edges. Three small holes, covered with netting, in the bottom of the shelf will serve as drains to keep the cafeteria free from water. When completed, fasten the counter to a tree near a window, to a corner of the house, or to one end of a window sill. If possible, locate it on the south side of the house. The shelf can be made more sheltered by nailing a vertical board to one or both ends.

Now you are ready to serve meals and here are some tips on "which foods for which birds." The attraction of suet has already been noted. Stock one side of the shelf with suet and bread or dog-biscuit crumbs. The cardinal, or redbird, likes crumbs. Many of these handsome song-

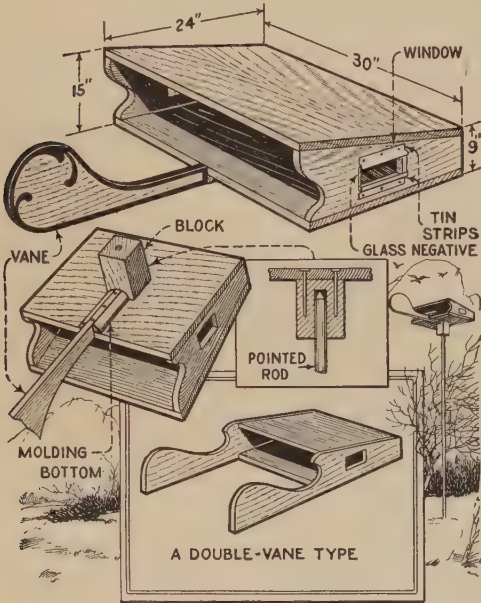
sters winter in the north and can be attracted to a food counter. The brown creeper, the bluejay, the junco, the mocking bird, chickadee and crow have been known to eat crumbs. Hemp seed, chaff, cracked corn, oats, canary seed, buckwheat, broken nuts, millet seed, puffed wheat or rice, rolled oats (the kind you eat as oatmeal for breakfast), sunflower seeds and fat pork are other foods eagerly eaten by various birds which, in different parts of the country, may choose to stay around all winter.

One of the neatest and most decorative bird cafeterias that you can establish in

your yard is made from a coconut. Buy one or more nuts that are dried out (they are not expensive) and proceed as follows: First, cut a small hole in the side of the nut. This may be of any size. If you want large birds to be your boarders cut a hole that will let them get their heads in. If you want to attract only the chickadees and nuthatches make the hole not more than $2\frac{1}{2}$ or 3 in. in diameter. Into the top of the nut put a screw eye, attach a piece of wire or stout cord to the eye and suspend the coconut from a limb of a tree in an accessible position, so that you can easily fill the interior with foods



for your bird guests. Chopped suet with peanuts or other food admixture is the bill of fare suggested for this coconut restaurant.



Constructional Details of Two Types of Weather-Vane Feeding Stations

Another way to rig up a coconut is to bore a small hole in one of its ends, wrap wire mesh around it, fasten a piece of stovepipe or other wire to the mesh and then suspend the nut from a branch near the house or from the porch. If possible place your station near a window so that you can watch your feathered guests. The wire mesh around the nut is rather desirable, as it gives the birds a good purchase on the nut when they alight on it.

For large gardens, farmers' orchards or estates, the weather-vane feeding station is a serviceable and very popular type. Any adult or boy handy with a saw and hammer can make one of these. The idea behind the weather-vane feature is to have a feeding place that swings with the wind, thus providing shelter for the birds as well as for the food.

Here is the way to make one of these weather-vane feeding stations so that it will be not only efficient but attractive. Take some $\frac{1}{2}$ -in. boards and construct a three-sided box, 24 to 30 in. long, 16 to 24 in. wide and 15 in. high at the open side. Let the top slope back so that it

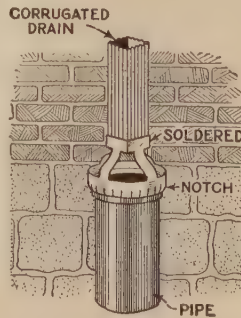
will be only 8 or 9 in. high at the rear of the box. For the floor use a fairly heavy board, as you want to nail a couple of weather vanes to it. In making the vanes you can devise all sorts of artistic designs to obtain an ornamental and attractive effect, but do not make them less than 2 ft. in length. The ends should be 8 to 10 in. wide, to make the whole swing easily in the wind.

The weather-vane station should be set upon a pole reaching 5 to 6 ft. above the ground. At this height the food counter is safe from neighborhood cats. One of the simplest ways to pivot the feeding station is to bore a hole in the center of the bottom of the box and also into the center of the pole. Make this just a trifle larger than the biggest spike that you can buy. Grease the spike, drop it into the hole, and you have a center pivot which will allow the station to swing as the wind blows. Another way is shown in the drawing.

Probably the most attractive and by far the most entertaining method of feeding birds during the winter months is to lure them to a window shelf. It means a three-ring circus for most any winter day, and the home owner can sit in a comfortable chair inside the house and watch the fun. Another advantage of luring winter birds to a window shelf is that crows won't be among those present. The black rascal refuses to get chummy in this manner.

Improving the Rain Spout

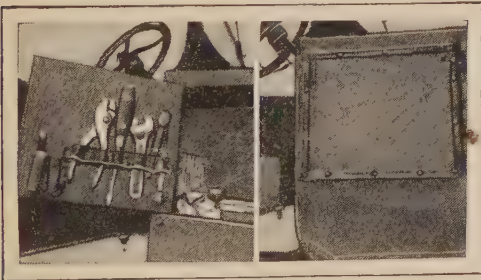
During the winter months perpendicular rain spouts are often weighted with ice and wall anchors are not always strong enough to hold the weight. After a spout had fallen twice in one winter, we hit on the plan shown in the illustration. Usually the spout is cut and swaged at the lower end where it enters the cast-iron or tile soil pipe. This arrangement allows the latter pipe to settle



and draw away from the gutter, throwing all of the weight of the pipe and ice on the wall anchors. To overcome this, we designed a bell flange, or collar, which was soldered to the outside of the spout and then flanged around the bell of the soil pipe. This gives more support and rigidity to the whole structure and thus will prevent further trouble from this cause.—O. S. Sprout, Lancaster, Pa.

Convenient Tool Chest for Auto

Finding it annoying to have to dig under the back seat every time I needed a small wrench, screwdriver or pliers, I put a tool compartment rack on the door of my car. I pulled off the lining of the front door and cut away the upper half of the metal lining. Then I made a little door of three-ply veneer to fit this opening, covered it with a piece of top material and finished it with some binding tape and black-headed upholstery tacks. On the inside of the door I made leather loops for the tire gauge, a pair of pliers, two screwdrivers, a small crescent wrench and a platinum file. In the pocket part of the door I keep a canvas water bucket, a parts catalog, a celluloid glare shield, extra valve cores and some coil points. The covering of the tool door is tacked onto the frame of the car door, thus completely concealing the



Compartment in Front Door of Auto Makes Tools Easily Accessible

hinges. There is a little button at the right, near the top, to keep it closed.—H. J. Blackledge, Tucson, Ariz.

ⒸBefore putting on a tire casing, wipe it carefully with a moist rag to insure that the inner tube will not be damaged by dirt or sand lodged in the casing.

Lads Make Their Own Ice Skates

Santa Claus had failed to furnish skates for these boys, so they decided to make them themselves. They proved their in-



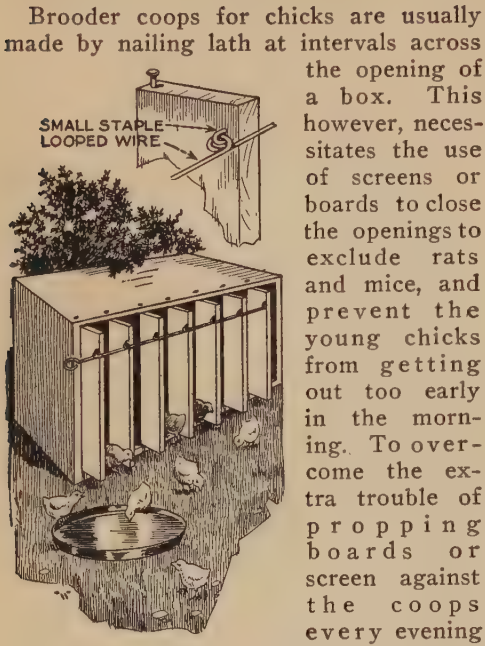
Lads Make Their Own Skates from Pieces of Firewood and Lengths of Wire

genuity by getting some wire barrel hoops, a few pieces of firewood and some string, and from these they fashioned the skates, which proved satisfactory and serviceable. The wood was whittled down to the approximate size of their feet and the front rounded, as shown in the photo. A shallow groove was cut along the edge to receive the wire, which was securely stapled on at the top and back. The wire was filed to a triangular form to prevent the skates from slipping sideways.

Testing Contact of Charging Clips

A pocket voltmeter with the terminals marked is useful when charging storage batteries at home with a small portable charger. The voltage is taken on the clips while the charger is going, and if much higher than the usual voltage of the battery, indicates a poor contact of the clips with battery terminals. Cleaning of the clips and terminals will bring down the voltage unless the battery is badly run down, when it may have a high resistance for a time, until the coating is removed from the plates. The voltmeter is also useful to show which terminal is positive if the markings are worn off.—E. T. Gunderson, Jr., Humboldt, Iowa.

Protection for Chicks in Brooder Coop



Brooder coops for chicks are usually made by nailing lath at intervals across the opening of a box. This however, necessitates the use of screens or boards to close the openings to exclude rats and mice, and prevent the young chicks from getting out too early in the morning. To overcome the extra trouble of propping boards or screen against the coops every evening is a simple matter if a few minutes more are spent at the time the coops are made. Strips of lath are cut to fit between the top and bottom of the open front of the coop, and nails are driven at the points indicated to serve as pivots upon which the lath can turn in the same manner as window shutters. A length of wire is bent to a loop at each lath and staples are used to attach the wire as shown. By moving the wire back and forth the shutters of the coop can be opened or closed. No large door is necessary at the front, as the coop is bottomless. This permits the removal of the mother hen when necessary to move or clean the coop.—G. E. Hendrickson, Argyle, Wis.

Equalizing Rear-Wheel Traction

Owing to the differential action of automobile rear wheels, the driver is sometimes at a loss what to do when stuck in a muddy or sandy rut. The trouble is that one wheel provides traction and the other one does not. In many cases one could easily get out without being hauled out by some one, if only the traction of the rear wheels were equalized. This can be done by simply pulling the emergency

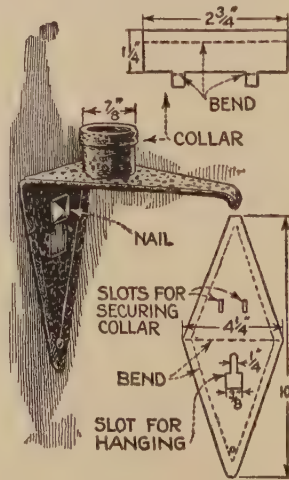
brake back just far enough to drag on both wheels, which will make them work evenly. This is only of use, however, where the emergency brake operates on the rear wheels, and is of no value when it operates on the transmission.—E. R. Haan, Chicago.

Hint on Varnishing

In varnishing, the worst trouble is the collection of dust on the treated surface. Any amateur painter can do a good job, however, by observing the following directions: First, a new brush should be used and this be cleaned by tapping it on the palm of the hand to remove loose bristles and dust; then scald the brush in boiling water to soften it and finally let it soak in gasoline for about two hours; after sandpapering the article to be varnished, the surface is carefully cleaned with a rag. Then apply the varnish and let it dry hard. Dust that collects after varnishing may be removed with a paste of pumicestone and oil rubbed with a piece of heavy felt. A fine job will result.

Homemade Colonial Candle Holders

Decorative candle holders of the colonial type are easy to make and cost very little. They consist of a flat piece of bronze or sheet iron about $\frac{1}{16}$ in. thick, cut to a diamond shape, as indicated, and



bent at right angles, with a small collar to hold the candle. The forge marks are produced by hammering it irregularly, holding the hammer slightly tilted. To match the holder, the head of a large nail is flattened and hammered square. It is driven into the wall so that the holder can be slipped on easily.—G. A. Luers, Washington, D. C.

Foundry Work at Home

I. The Equipment

Many amateur mechanics who require small metal castings in their work would like to make their own castings. This can easily be done at home without going to any great expense, and the variety and usefulness of the articles produced will make the equipment a good investment.

With the easily made devices about to be described, the young mechanic can make his own telegraph keys and sounders, battery zincs, binding posts, engines, cannons, bearings, small machinery parts, models and miniature objects, ornaments of various kinds, and duplicates of all these, and many other interesting and useful articles.

The first thing to make is a molding-bench, as shown in Fig. 1. It is possible to make molds without a bench, but it is a mistake to try to do this, as the sand is sure to get on the floor, whence it is soon tracked into the house. The bench will also make the operation of molding much easier and will prove to be a great convenience.

The bench should be made of lumber about 1 in. thick and should be constructed in the form of a trough, as shown. Two cleats, A A, should be nailed to the front and back to support the cross-boards, B B, which in turn support the mold while it is being made. The object of using the cleats and removable cross-boards instead of a stationary shelf is to give access to the sand, C, when it is being prepared.

About one or two cubic feet of fine molding-sand will be required, which may be purchased at the nearest foundry for a small sum. Yellow sand will

be found a little better for the amateur's work than the black sand generally used in most foundries, but if no yellow sand can be obtained the black kind will do. If there is no foundry

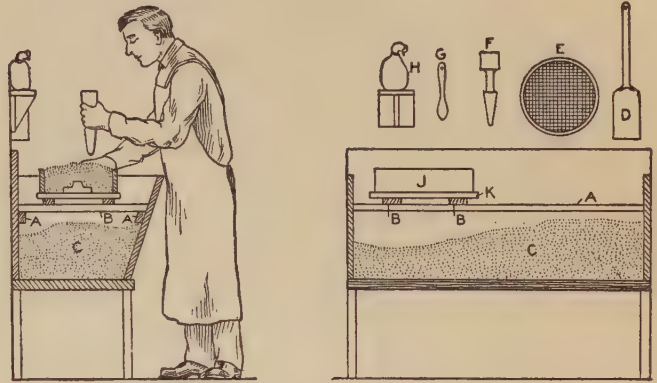


Fig. 1—Convenient Arrangement of Bench and Tools

near at hand, try using sand from other sources, giving preference to the finest sand and that which clings together in a cake when compressed between the hands. Common lake or river sand is not suitable for the purpose, as it is too coarse and will not make a good mold.

For mixing and preparing the sand a small shovel, D, and a sieve, E, will be required. If desired the sieve may be homemade. Ordinary wire netting such as is used in screen doors, is about the right mesh, and this, nailed to replace the bottom of a box, makes a very good sieve.

The rammer, F, is made of wood, and is wedge-shaped at one end and flat at the other, as shown. In foundries each molder generally uses two rammers, but for the small work which will be described one will be sufficient. An old teaspoon, G, will be found useful in the molding operations and may be hung on the wall or other convenient place when not in use.

The cloth bag, H, which can be made

of a knitted stocking, is filled with coal-dust, which is used for a parting medium in making the molds. Take a small lump of soft coal and reduce to powder by pounding. Screen out all the coarse pieces and put the remainder in the bag. A slight shake of the bag

exactly the same relative position whenever they are put together.

After the flask is done make two boards as shown at K, Fig. 1, a little larger than the outside of the flask. A couple of cleats nailed to each board will make it easier to pick up the mold when it is on the floor.

A cast-iron glue-pot makes a very good crucible for melting the metal, which can be either aluminum, white metal, zinc or any other metal having a low melting-point. This completes the equipment with the exception of one or two simple devices which will now be described.

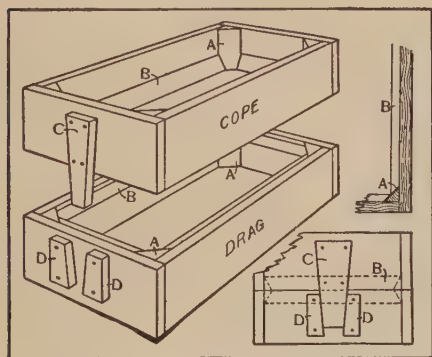


Fig. 2—Homemade Flask

over the mold will then cause a cloud of coal-dust to fall on it, thus preventing the two layers of sand from sticking, but this operation will be described more fully later on.

The flask, J, Fig. 1, is shown more clearly in Fig. 2. It is made of wood and is in two halves, the "cope," or upper half, and the "drag," or lower part. A good way to make the flask is to take a box, say 12 in. by 8 in. by 6 in. high, and saw it in half longitudinally, as shown. If the box is not very strong, the corners should be braced with triangular wooden strips, A A, which should be nailed in, previous to sawing. The wooden strips B B are used to hold the sand, which would otherwise slide out of the flask when the two halves of the mold are separated.

The dowels, CC, are a very important part of the flask as upon them depends the matching of the two halves of the mold. A wedge-shaped piece, CC, is nailed to each end of the cope, and the lower pieces, DD, are then nailed on the drag so that they just touch C when the flask is closed. The two halves of the flask will then occupy

II—How to Make a Mold

Having finished making the flask and other equipment, as described, everything will be ready for the operation of molding. It would be well for those who have never had any experience in this line to visit a small brass foundry, where they can watch the molders at work, as it is much easier to learn by observation; but they must not expect to make a good mold at the first trial. The first attempt usually results in the sand dropping out of the cope when it is being lifted from the drag, either because of insufficient ramming around the edges or because the sand is too dry.

A good way to tell when the sand is moist enough is to squeeze it in the hand. If it forms into a cake and shows all the finger-marks, it has a sufficient amount of moisture, but if it crumbles or fails to cake it is too dry. An ordinary watering-pot will be found useful in moistening the sand, but care should be taken not to get it too wet, or the hot metal coming in contact with it when the mold is poured will cause such rapid evaporation that the mold will "boil" and make a poor casting. A little practice in this operation will soon enable the molder to determine the correct amount of moisture.

When molding with sand for the first time it will be necessary to screen it all

before using it, in order to remove the lumps, and if water is added, the sand should be thoroughly shoveled until the moisture is evenly distributed. The sand is then ready for molding.

The operation of making a mold is as follows: The lower half of the flask, or "drag," and the pattern to be molded are both placed on the cover board as shown at A. A quantity of sand sufficient to completely cover the pattern is then sifted into the drag, which is then filled level with the top with unscreened sand. This is rammed down slightly with the rammer, and then more sand is added until

ming, pound evenly all over the surface with the blunt end of the rammer.

After ramming, scrape off the surplus sand with a straight-edged stick, as shown at C, and scatter about $\frac{1}{8}$ in. of loose sand over the surface for a good bearing. Place another cover board on top, as shown at D, and by grasping with both hands, as shown, turn the drag other side up. Remove the upper cover board and place the upper half of the flask, or "cope," in position, as shown at E.

In order to prevent the two layers of sand sticking together, the surface of the sand at E should be covered with

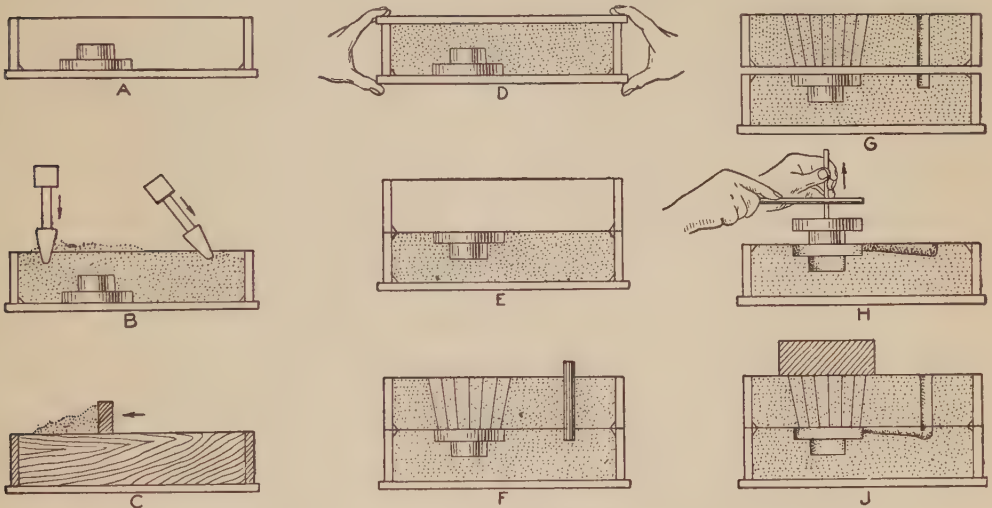


Fig. 3—Making a Mold

it becomes heaped up as shown at B. It is then rammed again as before.

It is impossible to describe just how hard a mold should be rammed, but by observing the results the beginner can tell when a mold is too hard or too soft, and thus judge for himself. If the sand falls out of the flask when lifting the cope, or if it opens up or spreads after it is poured, it shows that the mold has been rammed too little, and if the surface of the sand next to the pattern is cracked it shows that the mold has been rammed too hard. It will be found that the edges of the mold can stand a little more ramming than the middle. In finishing the ram-

coal-dust. This is done by shaking the coal-dust bag over the flask, after which the dust on the pattern may be removed by blowing. The cope is then filled with sand and rammed in exactly the same manner as in the case of the drag.

After the ramming is done a number of vent holes are made, as shown at F, from the surface of the mold to the pattern, in order to allow the escape of air and steam when the mold is being poured. These vent holes may be made by pushing a wire about the size of a knitting-needle down through the sand until it touches the pattern. The "sprue," or pouring-hole, is next cut,

by means of the sprue-cutter shown at the right, which consists of a piece of thin brass or steel tubing about $\frac{3}{4}$ in. in diameter.

Now comes the critical part of the molding operation—that of lifting the cope from the drag. It is here that the amateur often becomes discouraged, as the sand is liable to fall out of the cope and spoil the mold; but with a little practice and patience the molder can lift the cope every time without breaking it, as shown at G.

The next operation is that of cutting the gate, which carries the molten metal from the sprue to the opening left by the pattern. This is done with a spoon, a channel being cut about $\frac{3}{4}$ in. wide and about $\frac{1}{4}$ in. deep. The pattern is then drawn from the mold, as shown at H, by driving a sharp-pointed steel rod into the pattern and lifting it from the sand. When a metal pattern is used a thread rod is used, which is screwed into a tapped hole in the pattern. Before drawing it is well to tap the drawing-rod lightly with another and larger rod, striking it in all directions and thus loosening the sand slightly from the pattern. Some molders tap the pattern gently when withdrawing, as shown at H, in order to loosen any sand which has a tendency to stick.

After drawing the pattern, place the cope back on the drag, as shown at J. Place a brick or other flat, heavy object on top of the mold above the pattern, to prevent the pressure of the melted metal separating the two halves of the mold, and then pour.

III—Melting and Pouring

Having prepared one or more molds, the next operation is that of melting and pouring. An ordinary cast-iron glue-pot makes a good crucible and can be easily handled by a pair of tongs, made out of steel rod, as shown in the sketch. In order to hold the tongs together a small link can be slipped on over the handle, thus holding the crucible securely.

A second piece of steel rod bent in the form of a hook at the end is very useful for supporting the weight of the crucible and prevents spilling the molten metal should the tongs slip off the crucible. The hook is also useful for removing the crucible from the fire, which should be done soon after the metal is entirely melted, in order to prevent overheating. The metal should be poured into the mold in a small stream, to give the air a chance to escape, and should not be poured directly into the center of the opening, as the metal will then strike the bottom hard enough to loosen the sand, thus making a dirty casting.

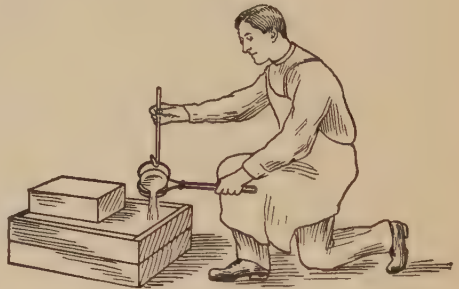


Fig. 4—Pouring the Metal

If, after being poured, the mold sputters and emits large volumes of steam, it shows that the sand is too wet, and the castings in such cases will probably be imperfect and full of holes.

A mold made in the manner previously described may be poured with any desired metal, but a metal which is easily melted will give the least trouble. One of the easiest metals to melt and one which makes very attractive castings is pure tin. Tin melts at a temperature slightly above the melting point of solder, and, although somewhat expensive, the permanent brightness and silverlike appearance of the castings is very desirable. A good "white metal" may be made by mixing 75% tin, 15% lead, 5% zinc and 5% antimony. The object of adding antimony to an alloy is to prevent shrinkage when cooling.

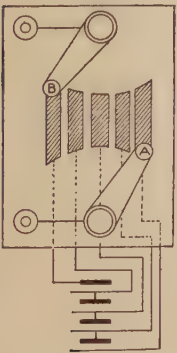
A very economical alloy is made by melting up all the old type-metal, bab-bitt, battery zincs, white metal and other scrap available, and adding a little antimony if the metal shrinks too much in cooling. If a good furnace is available, aluminum can be melted without any difficulty, although this metal melts at a higher temperature than any of the metals previously mentioned.

In casting zincs for batteries a separate crucible, used only for zinc, is very desirable, as the presence of a very small amount of lead or other impurity will cause the batteries to polarize. A very good way to make the binding posts is to remove the binding posts from worn-out dry batteries and place them in the molds in such a way that the melted zinc will flow around them.

The time required for a casting to solidify varies with the size and shape of the casting, but unless the pattern is a very large one about five minutes will be ample time for it to set. The casting is then dumped out of the mold and the sand brushed off. The gate can be removed with either a cold chisel or a hacksaw, and the casting is then ready for finishing.

Battery Switch

In cases where batteries are used in series and it is desirable to change the

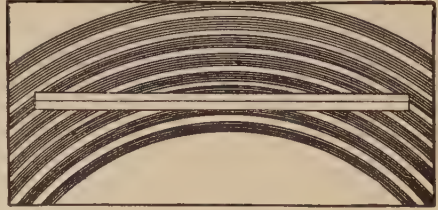


strength and direction of the current frequently, the following device will be found most convenient. In my own case I used four batteries, but any reasonable number may be used. Referring to the figure, it will be seen that by moving the switch A toward the left the current can be reduced from four batteries to none, and then by moving the switch B toward the right the current can be turned on in the opposite

direction to the desired strength. In the various positions of these two switches the current from each individual cell, or from any adjacent pair of cells, may be used in either direction.—Contributed by Harold S. Morton, Minneapolis.

An Optical Illusion

The engraving shows a perfectly straight boxwood rule laid over a number of turned brass rings of various sizes. Although the effect in the illus-



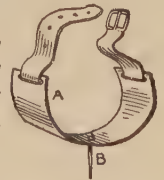
An Optical Illusion

tration is less pronounced than it was in reality, it will be noticed that the rule appears to be bent, but sighting along the rule from one end will show that it is perfectly straight.

The brass rings also appear distorted. The portions on one side of the rule do not appear to be a continuation of those on the other, but that they really are can be proved by sighting in the same manner as before.—Contributed by Draughtsman, Chicago.

New Method of Lifting a Table

To perform this feat effectively the little device illustrated will be required. To make it take a sheet-iron band, A, $\frac{3}{4}$ in. wide and attach a strap to fasten on the forearm between the wrist and elbow. Put a sharp needle point, B, through the sheet-iron so that it extends $\frac{3}{4}$ in. outward. Make one of these pieces for each arm.



In lifting the table first show the hands unprepared to the audience and also a light table, removing the cover to show that the surface of the table is not prepared in any way. Then replace the table,

rest the hands upon it and at the same time press the needle points in the arm pieces into the wood of the table, which will be sufficient to hold it, says a correspondent of the Sphinx. Then walk down among the audience.

How to Make a Paddle Boat

A rowboat has several disadvantages. The operation of the oars is both tiresome and uninteresting, and the oarsman is obliged to travel backward.



Paddle Boat in Operation

By replacing the oars with paddles, as shown in the illustration, the operator can see where he is going and enjoy the exercise much better than with oars. He can easily steer the boat with his feet, by means of a pivoted stick in the bottom of the boat, connected by cords to the rudder.

At the blacksmith shop have a $\frac{5}{8}$ -in. shaft made, as shown at A, Fig. 2. It will be necessary to furnish a sketch giving all the dimensions of the shaft, which should be designed to suit the dimensions of the boat, taking care that sufficient clearance is allowed, so that the cranks in revolving will not strike the operator's knees. If desired, split-wood handles may be placed on the cranks, to prevent them from rubbing the hands.

The bearings, B, may be made of hardwood, but preferably of iron pipe filled with melted babbitt. If babbitt is used, either thoroughly smoke or chalk the shaft or wrap paper around it to prevent the babbitt sticking. The pieces of pipe may be then fastened to the boat by means of small pipe straps, such as may be obtained at any plumber's at a very small cost.

The hubs, C, should be made of wood, drilled to fit the shaft and mortised out to hold the paddles, D. The covers, E, may be constructed of thin wood or galvanized iron and should be braced by triangular boards, as shown in Fig. 1. If galvanized iron is used, it should be exposed to the weather two or three months before painting, or the paint will come off, spoiling its appearance.

Peculiar Properties of Ice

Of all the boys who make snowballs probably few know what occurs during the process. Under ordinary conditions water turns to ice when the temperature falls to 32° , but when in motion, or under pressure, much lower temperatures are required to make it a solid. In the same way, ice which is somewhat below the freezing point can be made liquid by applying pressure, and will remain liquid until the pressure is removed, when it will again return to its original state. Snow, being simply finely divided ice, becomes liquid in places when compressed by the hands, and when the pressure is removed the liquid portions solidify and unite all the particles in one mass. In extremely cold weather it is almost

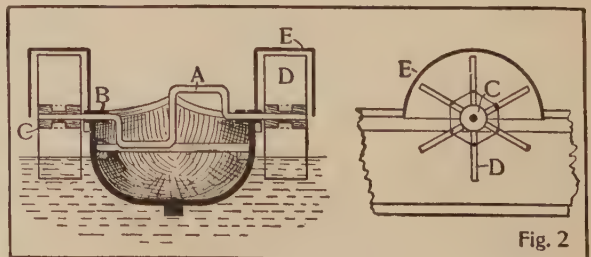
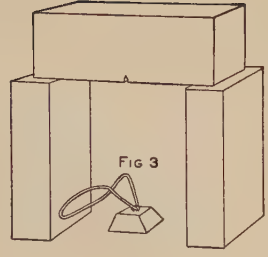
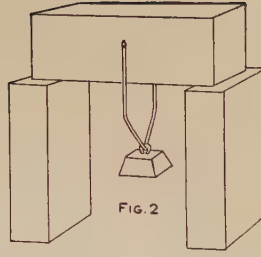
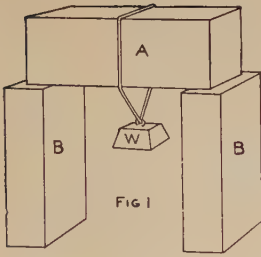


Fig. 2

Detail of Paddle Boat

impossible to make a snowball, because a greater amount of pressure is then required to make the snow liquid.

This process of melting and freezing under different pressures and a constant temperature is well illustrated by the experiment shown in Figs. 1, 2 and 3. A block of ice, A, Fig. 1, is sup-



Experiment with a Block of Ice

ported at each end by boxes BB, and a weight, W, is hung on a wire loop which passes around the ice as shown. The pressure of the wire will then melt the ice and allow the wire to sink down through the ice as shown in Fig. 2. The wire will continue to cut its way through the ice until it passes all the way through the piece, as shown in Fig. 3. This experiment not only illustrates how ice melts under pressure, but also how it solidifies when the pressure is removed, for the block will still be left in one piece after the wire has passed through.

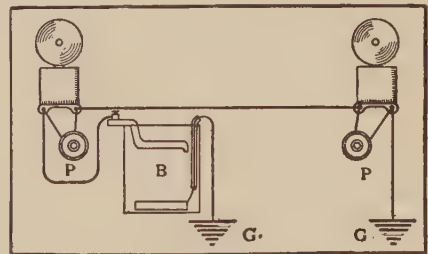
Another peculiar property of ice is its tendency to flow. It may seem strange that ice should flow like water, but the glaciers of Switzerland and other countries are literally rivers of ice. The snow which accumulates on the mountains in vast quantities is turned to ice as a result of the enormous pressure caused by its own weight, and flows through the natural channels it has made in the rock until it reaches the valley below. In flowing through these channels it frequently passes around bends, and when two branches come together the bodies of ice unite the same as water would under the same conditions. The rate of flow is often very slow; sometimes only one or two feet a day, but, no matter how slow the motion may be, the large body of ice has to bend in moving.

This property of ice is hard to illustrate with the substance itself, but may be clearly shown by sealing-wax, which resembles ice in this respect. Any attempt to bend a piece of cold sealing-

wax with the hands results in breaking it, but by placing it between books, as shown on page 65, or supporting it in some similar way, it will gradually change from the original shape A, and assume the shape shown at B.

Return-Call Bell With One Wire

To use only one wire for a return-call bell connect up as shown in the diagram, using a closed circuit or gravity battery, B. The current is flowing through both bells all the time, the same as the coils of a telegraph sounder, but is not strong enough to ring both connected in series. Pressing



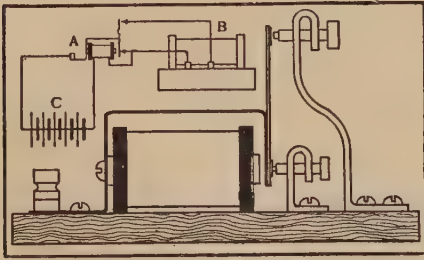
Wiring Diagram

either push button, P, makes a short circuit of that bell and rings the one at the other end of the line.—Contributed by Gordon T. Lane, Crafton, Pa.

Circuit Breaker for Induction Coils

Amateurs building induction coils are generally bothered by the vibrator contacts blackening, thus giving a high resistance contact, whenever there is any connection made at all. This trouble may be done away with by departing from the old single-contact vibrator and using one with self-cleaning

contacts as shown. An old bell magnet is rewound full of No. 26 double cotton-covered wire and is mounted



Interrupter for Induction Coil

upon one end of a piece of thin sheet iron 1 in. by 5 in. as per sketch. To the other end of the strip of iron is soldered a piece of brass $1/64$ in. by $1/4$ in. by 2 in., on each end of which has been soldered a patch of platinum foil $1/4$ in. square.

The whole is connected up and mounted on a baseboard as per sketch, the contact posts being of $1/8$ in. by $1/2$ in. brass, bent into shape and provided with platinum tipped thumb screws. The advantage of this style of an interrupter is that at each stroke there is a wiping effect at the heavy current contact which automatically cleans off any carbon deposit.

In the wiring diagram, A is the circuit breaker; B, the induction coil, and C, the battery.—Contributed by A. G. Ward, Wilksburg, Pa.

Spit Turned by Water Power

Many of the Bulgarian peasants do their cooking in the open air over bonfires. The illustration shows a labor-saving machine in use which enables the cook to go away and leave meat roasting for an hour at a time. The



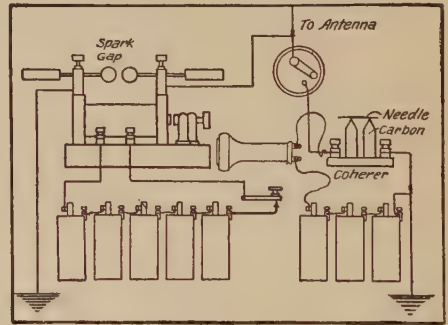
For a Summer Camp

illustration shows how the spit to which the meat is fastened is constantly turned by means of a slowly moving

water wheel. Some of our readers may wish to try the scheme when camping out. The success depends upon a slow current, for a fast-turning wheel will burn the meat.

A Short-Distance Wireless Telegraph

The accompanying diagrams show a wireless-telegraph system that I have used successfully for signaling a distance of 3,000 ft. The transmitter consists of an induction coil, about the size used for automobiles, a key or push-button for completing the circuit, and five dry batteries. The small single-point switch is left open as shown when sending a message, but when receiving it should be closed in order that the electric waves from the antenna may pass through the coherer. The coherer in this case is simply two electric-light carbons sharpened to a wedge at one end with a needle con-



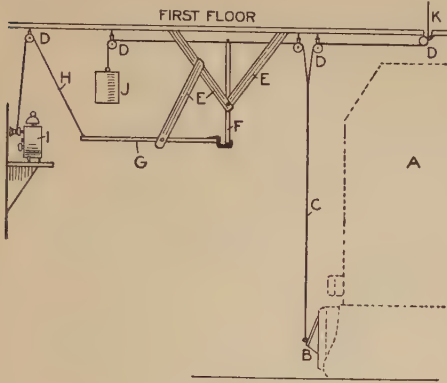
Wiring Diagram for Wireless Telegraph

necting the two, as shown. An ordinary telephone receiver is connected in series with the coherer, as shown. To receive messages hold the receiver to the ear and close the switch, and answer by opening the switch and operating the key.—Contributed by Coulson Glick, Indianapolis.

Automatic Draft-Opener

A simple apparatus that will open the draft of the furnace at any hour desired is illustrated. The parts are: A, furnace; B, draft; C, draft chain; D, pulleys; E, wooden supports; F, vertical lever; G, horizontal lever; H,

cord; I, alarm clock; J, weight. K shows where and how the draft is regulated during the day, the automatic



Draft Regulator

device being used to open it early in the morning. The spool on the alarm clock is fastened to the alarm key by sawing a slit across the top of the spool and gluing it on. When the alarm goes off a cord is wound up on the spool and pulls the horizontal lever up, which releases the vertical lever and allows the weight to pull the draft open.—Contributed by Gordon Davis, Kalamazoo, Mich.

A Window Conservatory

During the winter months, where house plants are kept in the home, it is always a question how to arrange them so they can get the necessary light without occupying too much room.

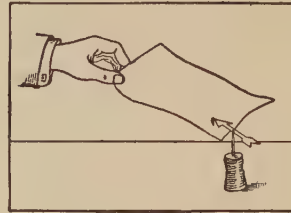
The sketch shows how a neat window conservatory may be made at small cost that can be fastened on the house just covering a window, which will provide a fine place for the plants. The frame (Fig. 2) is made of about 2 by 2-in. material framed together as shown in Fig. 3. This frame should be made with the three openings of such a size that a four-paned sash, such as used for a storm window,

will fit nicely in them. If the four vertical pieces that are shown in Fig. 2 are dressed to the right angle, then it will be easy to put on the finishing corner boards that hold the sash.

The top, as well as the bottom, is constructed with two small pieces like the rafters, on which is nailed the sheathing boards and then the shingles on top and the finishing boards on the bottom.

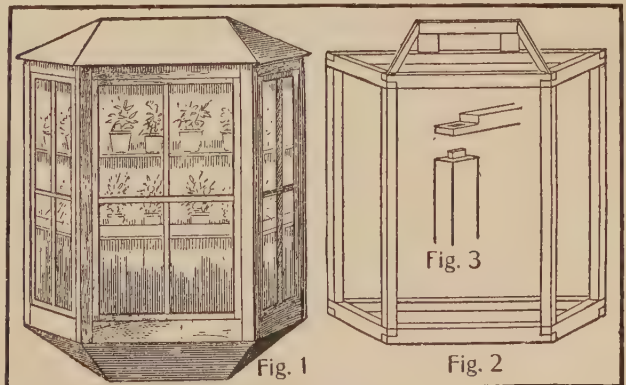
How to Make an Electroscope

An electroscope for detecting electrified bodies may be made out of a piece of note paper, a cork and a needle. Push the needle into the cork, and cut the paper in the shape of a small arrow. Balance the arrow on the needle

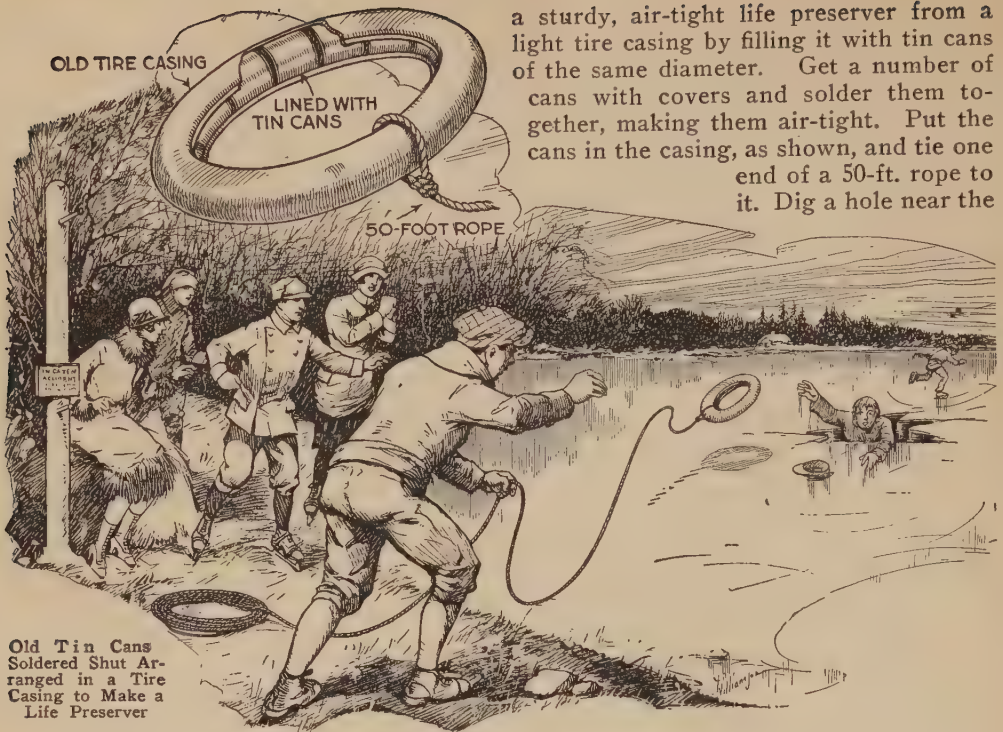


Simple Electroscope

as shown in the sketch, and the instrument will then be complete. If a piece of paper is then heated over a lamp or stove and rubbed with a piece of cloth or a small broom, the arrow will turn when the paper is brought near it.—Contributed by Wm. W. Grant, Halifax, N. S., Canada.



Artistic Window Boxes



Old Tin Cans
Soldered Shut
Arranged in a Tire
Casing to Make a
Life Preserver

Life Preserver for the Skating Pond

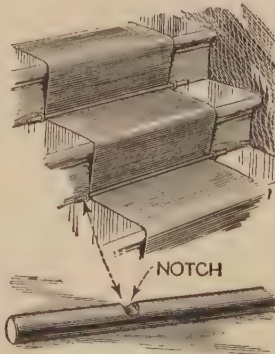
Whether you skate on a small pond or a large lake, you should have a life preserver hung upon a post near the edge of the ice in case of accident. You can make

a sturdy, air-tight life preserver from a light tire casing by filling it with tin cans of the same diameter. Get a number of cans with covers and solder them together, making them air-tight. Put the cans in the casing, as shown, and tie one end of a 50-ft. rope to it. Dig a hole near the

edge of the lake and set up a tall post, with its top well out of the way of curious youngsters. Drive a spike near the top of the post and another one a few feet lower down. Then place the tire over the top nail and coil the rope on the other one.

Non-Slipping Stair-Carpet Rods

If metal rods are used to hold a stair carpet in position it will be found that they have an annoying tendency to slip out of the eyes. This can be prevented by filing a notch in each, as shown in the drawing. If screweyes or clips are used to hold the rods, the latter will be forced against the former by the carpet, the notches registering with the clips, so that



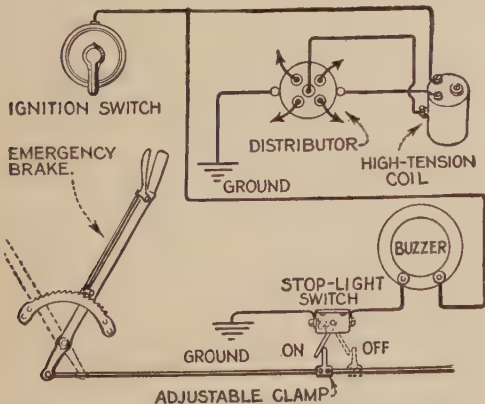
the rod cannot slip out sideways. The notch need only be filed out at one side, and need not be deep. It can quickly be made with a flat file. The width of the notch should be about $\frac{1}{16}$ in. greater than the width of the screweye. To remove the rod the latter is pressed down until the notch is clear of the screweye.—C. A. Oldroyd, Barrow-in-Furness, Eng.

Buzzer Arranged to Prevent Running with Emergency Brakes On

Motorists, especially beginners, sometimes forget to release the emergency brakes when starting and their attention is not called to this fact until they smell burning paint and brake lining. But it is then too late, as the brakes will have to be readjusted or relined, which is expensive in any case, and annoying because of the

delay of having them fixed. A buzzer and switch, in combination with the emergency brake and ignition system, can easily be wired so that, when the emergency brakes are on, the buzzer will give warning as soon as the ignition is turned on, and cease sounding the moment the brakes are released. The materials necessary for this installation are a door buzzer, a stop-light switch and some insulated wire, which can be purchased at any accessory house. Fasten the switch under the car in a suitable position, or according to the directions that accompany it, and arrange the lever or the part that projects from the switch, to connect with the adjustable clamp on the emergency brake rod, as shown, so that when the brakes are on the switch will be thrown in. The buzzer can be fastened anywhere on the dash behind the instrument board. Connect, or ground, one side of the switch to the frame of the car and the other side to the buzzer terminal. Connect the other terminal of the buzzer to the wire that leads from the ignition switch to the high-tension coil, or the terminal on the coil that this wire connects to.

This done, everything should be in working order, and the buzzer will give warning as soon as the ignition switch is turned on, provided the emergency brakes



Buzzer Sounds Warning That Emergency Brake Is On When Starting Car

are on and the stop-light switch has been so adjusted that it is closed.—Francis G. Le Merle, Washington, D. C.



Whirling Clown Amuses Children

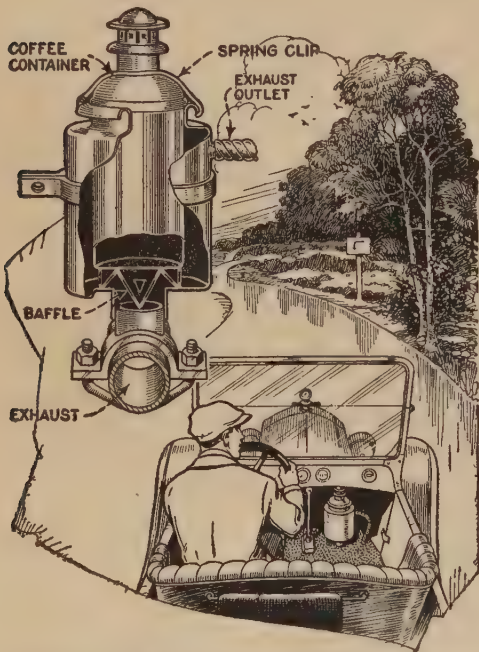
By pulling a string, a small figure of a clown, made of wood, can be whirled back and forth rapidly. A slat, cut from a piece of cigar-box wood, serves as a base and a peg is provided in the center for a spool to rotate on. At one end, a rubber band is fastened by means of a staple or screw-eye, and a length of cord is attached to the rubber band, looped around the spool and then passed through two staples, as indicated in the drawing. The clown also is cut out of cigar-box wood, painted suitably and attached to the top of the spool. Pulling the cord causes the spool and the clown to turn in one direction and releasing the cord allows the rubber band to contract, making the spool turn in the opposite direction.—E. F. Gustafson, Chicago, Ill.

Retouching Scuffed Places on Furniture

Mix a little color with turpentine to the same shade as the surrounding surface. Dip the end of your finger in shellac and touch the scuffed spot. Then immediately dip your finger in the color and apply it on the shellac. This will dry in a short time and the color will remain. When all the spots have been thus attended to, shellac, varnish or polish in the usual way.—Francis W. Henry, Pottsville, Pa.

Exhaust-Heater Coffee Pot for the Car

Hot, fresh coffee is invigorating on an auto trip so I made an exhaust-heated



Exhaust Heater Mounted under Dashboard Is Handy for Making Coffee on Long Trips

coffee pot for my car. A hole was cut in the exhaust pipe just ahead of the dash and a regular cut-out, with the valve removed, was attached just above the hole. A tinner made the outside retainer to fit a standard metal jar. The retainer was provided with a neck underneath to fit over the open cut-out, to permit entrance of the exhaust gas. A hole was drilled in the side near the top, a short nipple was soldered over it and a length of flexible, metallic hose was attached to provide an outlet for the exhaust. The top of the retainer was provided with a spring clip to hold the jar securely. Within the retainer, at the bottom, I had a concentric conical member, which served to deaden the effect of the exhaust both as to noise and pressure on the jar. Ports were cut through this piece so that the exhaust gases could readily pass through it and around the jar but not directly against it. The retainer was fastened to the car by means of a strap-iron bracket. Besides making coffee, one can boil eggs and cook soup, etc.,

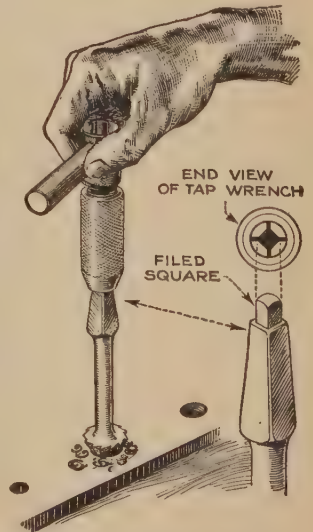
in this device. It will prove a boon on long trips, picnics, and the like.—C. C. Hermann, Moline, Ill.

Care of Knives and Forks

Silver knives and forks often have separate handles and pouring hot water over them when washing will cause the handles to loosen on the shanks. This can easily be repaired without going to the expense of taking them to the jeweler or some other party doing this kind of work. Heat the handles carefully without direct contact with fire and remove all the material which the handle holds. Then prepare a mixture consisting of beeswax, $\frac{1}{4}$ lb.; plaster of paris, $\frac{1}{4}$ lb., and rosin, 1 lb. Melt these ingredients together and fill the hole in the handles with the mixture. Before the handle cools insert the shank, being careful that it is in alignment so that the job will not have to be done over. The mixture can be put aside and used again, reheating it each time. It is inexpensive and easy to make so that this method offers a convenient and economical means of repairing and keeping the knives and forks in good shape all the time.—L. H. Georger, Buffalo, N. Y.

Tap Wrench Holds Countersink

When drilling holes in wood, it is inconvenient to change often from a bit to a countersink if both are used. If the countersink butt is squared with a file, as shown in the drawing, it may be fastened in a tap wrench, and can then be handled with much more convenience and does not have to be put in the chuck of the brace each time.—Richard C. Tarr, Gloucester, Mass.



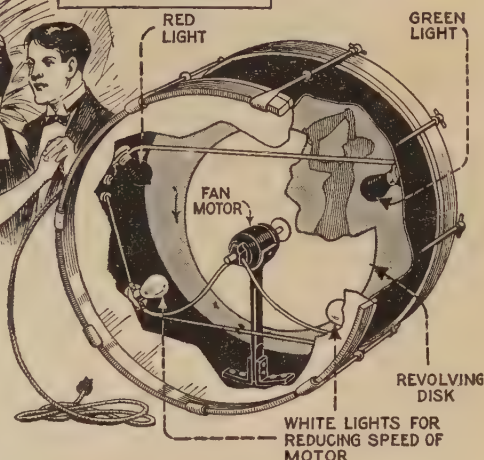


Increasing Jazz Effect of Drum

Jazz for the eye as well as for the ear is the idea of a drummer in a jazz orchestra, who has embodied his plan in a drum that displays a "moving" picture. He had a scene painted on the drumhead to represent a woman pouring water from a vase and, when the device is operating, it seems as if the water actually flowed. The effect was obtained by means of a revolving disk of celluloid, painted as indicated. The disk is driven by means of a fan motor, which is wired in series with two small electric-light bulbs. These serve the double purpose of reducing the speed of the motor and furnishing illumination. Two additional colored lights operated by a small thermo-static sign flasher intensify the effect of motion and color. The motor and disk are supported on a wooden post attached to the shell of the drum by means of two brass angle brackets. A length of flexible cord with a plug attached is connected to the motor, so that it is



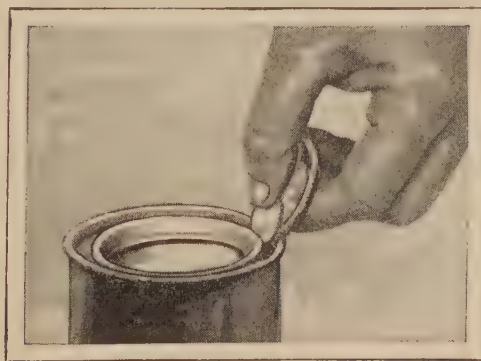
Drummer Intensifies Effect of Orchestra's Jazz Music by Realistic Display of Moving Water Poured from a Jug and Intermittent Flashes of Colored Lights



possible to plug in at any convenient socket. So realistic is the effect of this simple device that, when it was tried out at several fraternity dances, much sport was had in holding punch glasses near the figure in the scene as if getting some of the water.—H. N. Loeb, Cincinnati, Ohio.

Dollar-and-Dime Can Opener

Next time you have to open a can having a friction cover, take a silver dollar and a dime and pry off the cover as shown. The dollar gives enough leverage in the right place and the dime is slipped under the cover to raise it easily. You will save time, patience, a knife blade and also avoid the possibility of cutting yourself.—F. Bentley, Missouri Valley, Iowa.



Method of Opening Can by Using a Dollar and a Dime as a Lever

Runners for the Motorcycle

During the winter months of continuous snow, near Lake Superior, it is often

attached to the axle. In order to provide traction, it is, of course, necessary to use a skid chain on the rear wheel.—J. H. Deniston, Bayfield, Wis.



Provision of Runners on Motorcycle Permits Travel through Heavy Snow

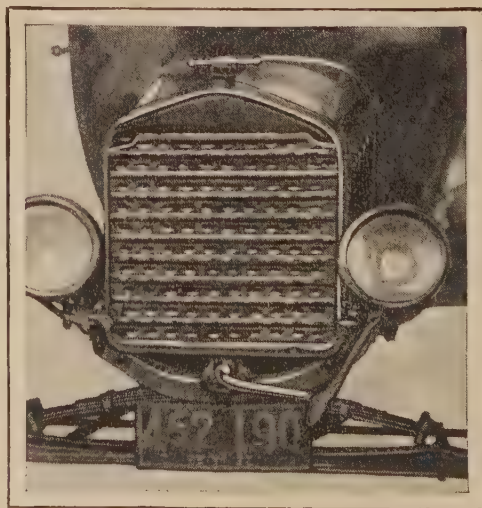
impossible to travel with autos. A doctor must, however, make his calls and as a horse and cutter are too slow, one doctor adapted his motorcycle to the snow-covered roads by the addition of runners, as shown in the photo. The front runner is made from an old wagon tire, 4 in. wide and 36 in. long. A 10-in. section at the front and a 3-in. section at the rear are curved upward. The runner is fastened to a 2-ft. length of 4 by 4-in. wood, gouged out to fit the tire, and the wheel is attached to the runner by means of clamps, shaped to fit around the rim and held in place with bolts. The runner is attached when the tire is partly deflated so that there will be a very tight fit when the tire is pumped up. The sidecar wheel is removed and a runner is provided. It is also made from a 36-in. length of old wagon tire, 2 in. wide, and is supported by a U-brace

How to Stencil Neatly

With painted and lacquered furniture quite the vogue at the present time, the following method for applying stencils will be helpful for the home worker. Cut any size or design suitable from light tag or two-ply bristol board. Fasten it to the work with four 2-oz. tacks to hold the stencil in place. Then, with a soft printers' roller, well inked, go over the stencil, applying pressure enough to make sure that the ink comes into the small corners. In removing the stencil care should be taken, when withdrawing tacks and lifting stencil, that the ink is not touched, and you will have a neat, clean-cut design, without hairy or fuzzy edges. The ink will dry as quickly as ordinary paint. If desired, a light coat of varnish may be applied over the design when dry.

Shield Keeps Auto Engine Warm

It is necessary that your Ford be kept warm on cold days if you are using it. This can be done by obtaining a piece of metal lath of the kind shown in the photo, cutting it to fit over the front of the radiator and attaching it with a couple of stove bolts. This, when painted black, will have the appearance of a winter front that has been purchased at some accessory store and will answer the purpose almost as well. It allows enough air to enter but the engine cannot overheat on a cold day.



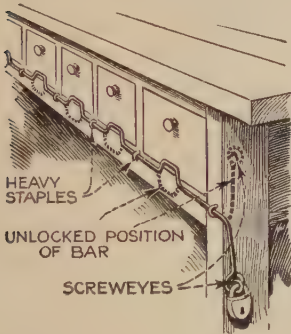
Radiator Cover for Cold Weather Can Be Made from Metal Lath

Rubber Band Replaces Book End

When books do not completely fill a shelf or are placed elsewhere without any support for the end ones, a strong rubber band will be found an efficient substitute for book ends. The band is slipped around the last two or three books and placed so as to coincide with the framing lines of the title so that it will not be conspicuous. Books held together in this way will stand quite firmly, preventing those next to them from falling, and a rubber band is likelier to be at hand than an extra book end.—Harold E. Benson, Denver, Colorado.

Several Drawers Locked with One Bolt

To eliminate the necessity of individual locks for the several tool drawers in his workshop, a garage owner made use of the illustrated attachment, which locks or releases all the drawers from one point at the end of the bench. A length of $\frac{1}{2}$ -in. round steel rod was shaped in the manner shown and attached to the bench just below the drawers by means of heavy



staples, which were clinched on the inside. The rod was bent at a right angle at one end of the bench and formed into an eye large enough to pass over a screw eye to which a padlock is attached, as shown. Another screw eye is fastened to the bench above the bar. The operation is obvious.

Making Gold Leaf Adhere Permanently

To make gold leaf adhere permanently to any surface, try the following: Put some isinglass in a little water and heat slowly without allowing it to boil. Add as much nitric acid as isinglass. Allow the mixture to cool and apply carefully with a brush. This mixture not only makes a permanent job of the work, but will not be absorbed by the paper pages of any book on which it may be used.

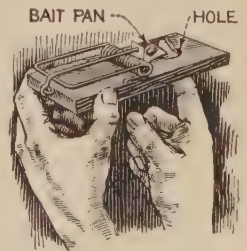


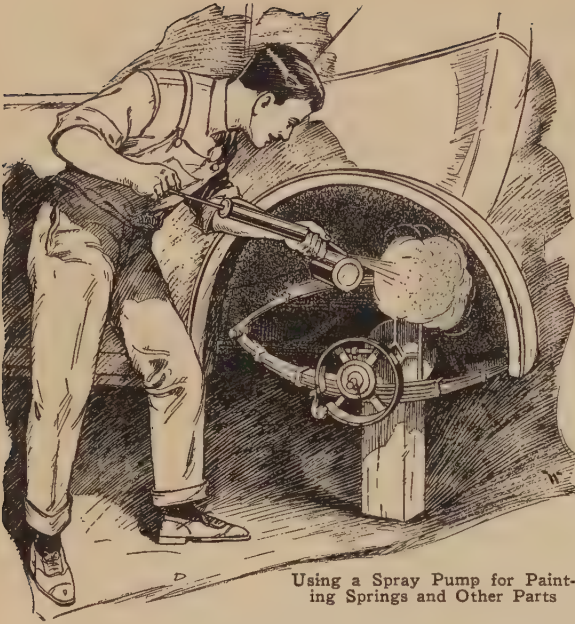
Paper Pulp Makes Good Fuel

I have been making paper fuel of the kind shown for a number of years from scrap paper that accumulates around the house. Each year I make enough to last the whole winter, burning it in an open grate. The paper is soaked to form a pulp and is then pressed into shape using molds made of 4-in. iron soil pipe, 12 in. long and sawed lengthwise. It is then allowed to dry out thoroughly. This makes good fuel, which gives plenty of heat, is economical and serves well also as kindling for starting a coal fire.—John E. Mason, Hamilton, Ont.

Setting Mousetraps

The danger of setting mousetraps can be eliminated by using the method shown in the illustration. A $\frac{3}{4}$ -in. hole is drilled through the wood base of the trap just under the end of the bait pan. By inserting the finger in the hole from the underside of the trap and lifting the pan to the position indicated, so that it engages with the catch holding the spring, you are fully safeguarded against any chance of injury to your fingers.





Using a Spray Pump for Painting Springs and Other Parts

Spray Pump for Painting Springs

Usually a good brush is used for painting the body and fenders of a car, as these surfaces are smooth and can be thoroughly cleaned before applying the paint. However, it is quite a difficult matter to clean the springs and other parts under the car and by painting them with a brush one always picks up dirt out of the cracks and corners, which covers the brush and spoils the painted surface. By doing the painting with a spray pump, as shown in the drawing, this trouble is avoided. If ordinary rust-proof paint is used no thinner is necessary, but auto enamel should be diluted with about ten per cent of turpentine. The spray enters the cracks and crevices, and places which are inaccessible with a brush.

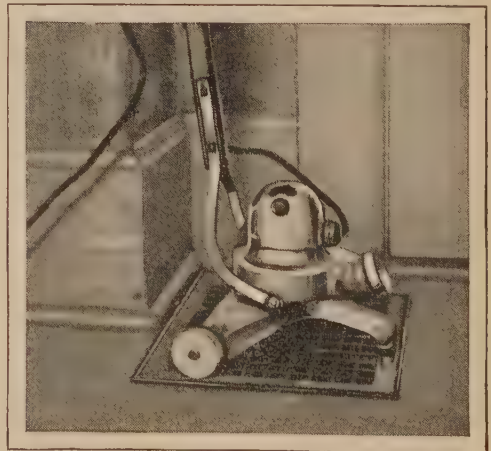
Soot for Furnace Covering

When cleaning out some large flue pipes at a power plant where a lot of wood, sawdust, etc., was burned in the boiler furnaces, a large quantity of soot had to be removed. As an experiment I made a thick mixture of this soot with water, then used equal parts of the soot mixture and ordinary asbestos cement to cover a heater, using the ordinary form of wire

netting as a holder for the compound. When the soot-asbestos covering dried out, not only had it fewer cracks than the asbestos coverings on other heaters, but the soot-asbestos surface also was cooler than the all-asbestos, which meant an appreciable saving in boiler efficiency.—J. E. Noble, Toronto, Can.

Vacuum Cleaner Helps Heat Second Floor

In old furnace installations the pipes often lead only to the first-floor rooms and the upper rooms are provided with floor registers extending through to the ceiling of the room below. The upper rooms get their heat in a very slow and indirect fashion in this way, and if these rooms have to be heated quickly, some auxiliary apparatus is almost necessary. One housewife overcomes the difficulty in a simple manner. When an upper room is to be heated she simply takes the dust bag out of the vacuum cleaner, places the sweeper over the open register and turns on the current. Acting as a power circulator the sweeper draws the warm air from the



Using a Vacuum Cleaner on Second-Floor Register to Draw Heat into Upper Rooms

room below and shoots it out into the cold upper room. It does it so fast and effectively that only a few minutes are required to make a large room comfortable.

Substitute for Child's Bow

An easily made substitute for a bow, which is especially desirable for children interested in archery, can be made from a discarded automobile inner tube. A strip, about $\frac{1}{2}$ in. wide, is cut across the tube, making a large rubber band. The arrows, which should be about 16 in. long, can be made from reeds or cat-tail rushes, by driving a shingle nail into the thick ends and wrapping them with adhesive tape. The arrows need not be feathered. To shoot them, slip the band over the thumb and first finger of the left hand. Then place the arrow in the band, grasping it through the rubber with the thumb and finger of the other hand. Stretch the band to its limit, then release it, and the arrow will be driven out of sight if aimed into the air. The thumb and finger serve as a crotch, while the band serves both as bow and string. Arrows may be shot with great accuracy as it is comparatively easy to aim. In shooting with the band, as with the bow, the arrow should be pulled back in line with the eyes. Children in our neighborhood are able to shoot nearly 200 ft., although 25 to 50 ft. is better for target practice.—C. Bernard Petersen, Minneapolis, Minn.

Sealing Extension-Cord Plug

One of the most common causes of short circuits in extension cords is the loosening of the bared ends from the screws in the plug, which in turn is caused by strain on the cord. A knot is usually tied in the cord by electricians to take the strain, but the method shown in the drawing is an additional safeguard. Melt some sealing wax and after fastening the bared ends tightly, pour in the wax until it is level with the outside edge.—Adolph F. Lonk, Chicago, Ill.



An Ice "Kickmobile"

Boys will find the "kickmobile" shown here quite different from ordinary outdoor winter devices. Fig. 1 is the footrest, about 20 in. long and 6 in. wide. It is made of 1-in. wood and an ice skate is securely screwed to it, as indicated. A steering post, with a crossbar attached to the top, is also provided, which completes the runner. The steering post can be made from a piece of willow branch or a strong broom handle, set snugly in a hole drilled in the center of the base, toward the front.

Vulcanizing Small Holes in Auto Tops

When a tear occurs in the top of an automobile, it is usually patched by the cement method or else the hole is stitched like the hole in a stocking. A better method of repair is to vulcanize the top. Fill the opening carefully with the heavy rubber mastic or tire dough used in filling small holes in casings. Then heat two flat-irons and press them against the rubber from each side, being careful not to have the iron so hot as to scorch the fabric. In three or four minutes the rubber will be vulcanized.—L. B. Robbins, Harwich, Massachusetts.

Tin Cup Used as a Level

On a camping trip, I had occasion to make a table and seat. As there was nothing horizontal or vertical to use to



Tin Cup Filled with Water Makes a Serviceable Level for Campers in Making Furniture and for Other Purposes

plumb things up, I took a tin cup and filled it to within $\frac{1}{8}$ in. of the brim and found that it made a very serviceable level. Table and seats came out perfectly true. —Albert L. Ball, Niagara Falls, N. Y.

Tape on Child's Legging

It is possible that many a young mother does not know a good method of keeping her child's legging elastic in condition, as it soon wears out under the child's foot. An easy and permanent method of mending is to buy a roll of electric tape from the 10-cent store and cover the elastic of each legging in the following way: Begin by unrolling several inches of the tape, then start at the point where the elastic is joined to the legging at the side and lay the end of the tape across the elastic in such a manner that the adhesive side will be stick-

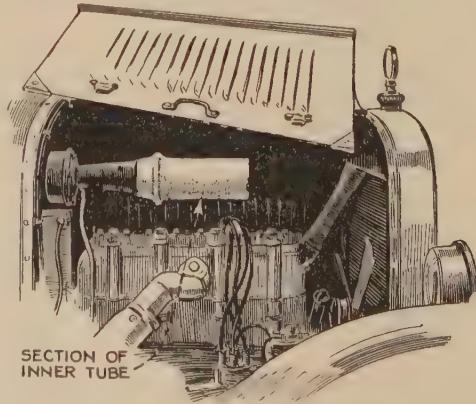
ing to the elastic. Continue to wind the tape around the elastic, several turns, by bringing the tape through the opening where the child's foot goes, and at the same time taking care to overlap the edge of the tape at each turn. In this way you will cover the entire elastic and terminate the winding at the end opposite that at which you started. You will find such a covering will enable the child to play about in wet weather, during winter, as the electric tape is not only waterproof but very tough and durable.—J. R. Clough, Washington, D. C.

Lighting a Fire in a New Fireplace

New fireplaces are likely to smoke badly when a fire is first built in them, due to the dampness of the flue. This is also true of a fireplace that has been unused for a considerable length of time. To overcome this smoking is a simple matter. Open any dampers and hold a lighted newspaper high up under the arch and at the beginning of the throat. One or two such applications of heat will absorb the moisture from the surface of the flue bricks and the fire can then be built with little danger of smoking.

Changing Tone of Auto Horn

By taking a piece of old inner tube and slipping the end over the horn, as shown,



Section of Inner Tube Slipped over Auto Horn Changes Its Tone Agreeably

a new tone can be obtained. A loud horn can be made to produce a soft tone resembling the moo of a cow. Horns having an armature give the best results. The piece of inner tube should be about 1 ft. long, and small pieces are cut off until the desired tone is obtained.—Carlton Groat, The Dalles, Oreg.

How to Make a Jump-Spark Coil

The induction coil is probably the most popular piece of apparatus in the electrical laboratory, and particularly is it popular because of its use in experimental wireless telegraphy. Ten years ago wireless telegraphy was a dream of scientists; today it is the plaything of school-boys and thousands of grown-up boys as well.

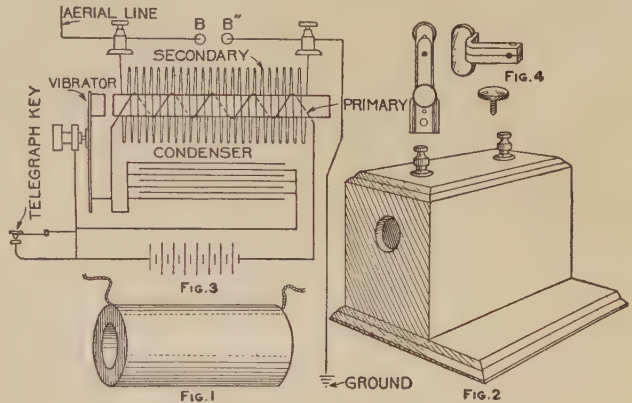
Divested of nearly all technical phrases, an induction coil may be briefly described as a step-up transformer of small capacity. It comprises a core consisting of a cylindrical bundle of soft-iron wires cut to proper length. By means of two or more layers of No. 14 or No. 16 magnet wire, wound evenly about this core, the bundle becomes magnetized when the wire terminals are connected to a source of electricity.

Should we now slip over this electromagnet a paper tube upon which has been wound with regularity a great and continuous length of No. 36 magnet wire, it will be found that the lines of force emanating from the energized core penetrate the new coil-winding almost as though it were but a part of the surrounding air itself, and when the battery current is broken rapidly a second electrical current is said to be induced into the second coil or secondary.

All or any of the parts of an induction coil may be purchased ready-made, and the first thing to do is to decide which of the parts the amateur mechanic can make and which would be better to buy ready-made. If the builder has had no experience in coil-winding it would probably pay to purchase the secondary coil ready-wound, as the operation of winding a mile or more of fine wire is very difficult and tedious, and the results are often unsatisfactory. In ordering the second-

ary it is always necessary to specify the length of spark desired.

The following method of completing a 1-in. coil illustrates the general details of the work. The same methods and circuits apply to small and larger coils. The ready-made secondary is in solid cylindrical form, about 6 in. long and $2\frac{5}{8}$ in. diameter, with a hole



Jump-Spark Coil

through the winding $1\frac{1}{4}$ in. in diameter, as shown in Fig. 1. The secondary will stand considerable handling without fear of injury, and need not be set into a case until the primary is completed. The primary is made of fine annealed No. 24 iron wire cut 7 in. or 8 in. in length, as the maker prefers, and bundled to a diameter of $\frac{7}{8}$ in. The wires may be straightened by rolling two or three at a time between two pieces of hard wood. If the amateur has difficulty in procuring this wire, the entire core may be purchased ready-made.

After the core wires are bundled, the core is wrapped with one or two layers of manila paper. The straighter the wire the more iron will enter into the construction of the core, which is desirable. Beginning half an inch from one end, No. 16 cotton-covered magnet wire is wound from one end to the other evenly and then returned, making two layers, and the terminals tied down to the core with twine. Core and primary are then immersed in boiling

paraffine wax to which a small quantity of resin and beeswax has been added. This same wax may be used later in sealing the completed coil into a box. Over this primary is now wrapped one layer of okonite tape, or same thickness of heavily shellacked muslin. This completed primary will now allow of slipping into the hole in the secondary.

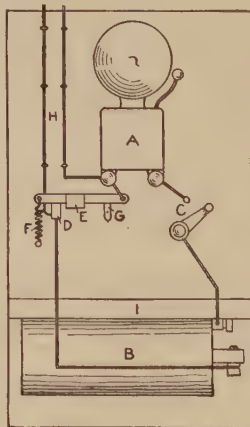
Should the secondary have been purchased without a case, a wooden box of mahogany or oak is made, large enough to contain the secondary and with an inch to spare all around, with room also for a small condenser; but if it is not convenient to do this work, a box like that shown in Fig. 2 may be purchased at a small cost. A $\frac{7}{8}$ -in. hole is bored in the center of one end, through which the primary core projects $\frac{1}{8}$ in. This core is to be used to attract magnetically the iron head of a vibrating interrupter, which is an important factor of the coil. This interrupter is shaped as in Fig. 4, and is fastened to the box in such a way that the vibrator hammer plays in front of the core and also that soldered connections may be made inside the box with the screws used in affixing the vibrator parts to the box. The condenser is made of four strips of thin paper, 2 yd. long and 5 in. wide, and a sufficient quantity of tin-foil. When cut and laid in one continuous length, each piece of tin-foil must overlap the adjoining piece a half inch, so as to form a continuous electrical circuit. In shaping the condenser, one piece of the paper is laid down, then the strip of tin-foil, then two strips of paper and another layer of foil, and finally the fourth strip of paper. This makes a condenser which may be folded, beginning at one end and bending about 6 in. at a time. The condenser is next wrapped securely with bands of paper or tape, and boiled in pure paraffine wax for one hour, after which it is pressed under considerable weight until firm and hard. One of the sheets of tin-foil is to form one pole of the condenser, and the other sheet, which is insulated from

the first, forms the other pole or terminal. (This condenser material is purchasable in long strips, ready for assembling.)

The wiring diagram, Fig. 3, shows how the connections are made. This method of connecting is suitable for all coils up to $1\frac{1}{2}$ -in. spark, but for larger coil better results will be obtained by using an independent type of interrupter, in which a separate magnet is used to interrupt the circuit. Besides the magnetic vibrators there are several other types, such as the mercury dash-pot and rotary-commutator types, but these will become better known to the amateur as he proceeds in his work and becomes more experienced in coil operation.

Combined Door Bell and Electric Alarm

This device consists of a battery and bell connection to an alarm clock which also acts as a door bell, the whole being mounted on a board 18 in. long and 12 in. wide.



Referring to the sketch accompanying this article, the letters indicate as follows: A, bell; B, battery; C, switch; D, V-shaped copper strip; E, copper lever with 1-in. flange turned on one side, whole length, 4 in.; F, spring to throw lever E down in V-shaped piece to make connection; G, lever to hold out E when device is used as a door bell; lines H, go, one from bell, A, and one from battery, B, to the door; I, shelf for clock.

See that the ring in the alarm key of the clock works easily, so that when it is square across the clock it will drop down. Fasten a piece of copper about

1 in. long to key, then wind the alarm just enough so that the key stands straight up and down. Place the clock on the shelf and the key under the flange of lever E. Pull lever G down out of the way and close the lever on the switch. The alarm key will turn and drop down, letting lever E drop into the V-shaped piece D and make connection.

For the door-bell connection close lever on switch C, and put G up so that D and E do not come in contact. If any one is ill and you do not want the bell to ring, open switch C.

The wiring for this device may all be on the back of the board. The switch and levers are fastened with small screw bolts, which allows wiring at the back. Saw two spools in half and fasten the halves to the four corners of the board at the back, and the apparatus may be put up where one likes.

To Build a Small Brass Furnace

Bend a piece of stout sheet iron 23 in. by 12 in. round so that the inside diameter is 7 in., and then rivet the seam. Fit in a round piece of sheet iron for the bottom. Make a hole about the size of a shilling in the side, 2 in. from the bottom. This is for blowing.

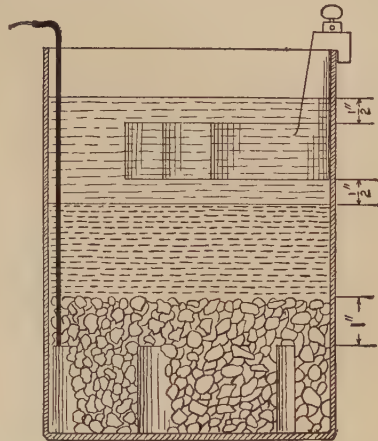


Line the furnace, bottom and sides with fire-clay to a depth of $\frac{1}{2}$ in. Use charcoal to burn and an ordinary bellows for blowing, says the Model Engineer, London. The best blast is obtained by holding the nozzle of the bellows about an inch from the hole, instead of close to it.

⚠Don't wrap paper around a lamp for a shade. You might go away and forget it and a fire might be started from the heat. Use a glass or metal shade. That is what they are for.

Why Gravity Batteries Fail to Work

Many amateur electricians and some professionals have had considerable trouble with gravity batteries. They



Setting Up a Gravity Battery

follow directions carefully and then fail to get good results. The usual trouble is not with the battery itself, but with the circuit. A gravity battery is suitable only for a circuit which is normally closed. It is therefore undesirable for electric bells, induction coils and all other open-circuit apparatus. The circuit should also have a high resistance. This makes it impractical for running fan motors, as the motor would have to be wound with fine wire and it would then require a large number of batteries to give a sufficiently high voltage.

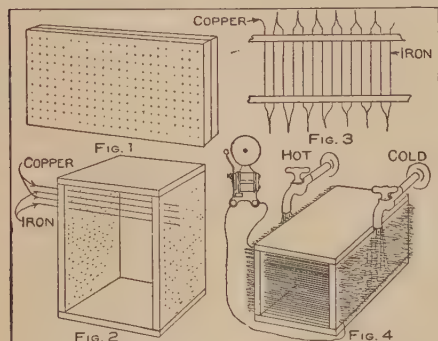
To set up a gravity battery: Use about $3\frac{1}{2}$ lb. of blue stone, or enough to cover the copper element 1 in. Pour in water sufficient to cover the zinc $\frac{1}{2}$ in. Short-circuit for three hours, and the battery is ready for use. If desired for use immediately, do not short-circuit, but add 5 or 6 oz. of zinc sulphate.

Keep the dividing line between the blue and white liquids about $\frac{1}{2}$ in. below the bottom of the zinc. If too low, siphon off some of the white liquid and add the same amount of water, but do not agitate or mix the two solutions. This type of battery will give about 0.9 of a volt, and should be used on a circuit of about 100 milli-amperes.

How to Make a Thermoelectric Battery

By ARTHUR E. JOERIN

A novel way of producing an electric current by means of hot and cold water, heat from a match or alcohol



Details of Battery

lamp, is obtained from a device constructed as shown in the sketch. Take two hardwood boards, marble, or slate plates, about 8 or 10 in. long, place them together, as in Fig. 1, and mark and drill about 500 holes. These two pieces should be separated about 8 in. and fastened with boards across the ends, as shown in Fig. 2.

Take soft copper wire, not smaller than No. 18 gauge, and cut in lengths to pass through the holes in the two boards, leaving sufficient end to make a tie. It will require about 70 ft. of wire to fill one-half the number of holes. Also, cut the same number of lengths from the same gauge galvanized-iron wire to fill the remaining holes. The wires are put through the holes in the boards alternately, that is: begin with copper, the next hole with iron, the next copper, the next iron, and so on, twisting the ends together as shown in Fig. 3. The connections, when complete, should be copper for the first and iron for the last wire.

When the whole apparatus is thus strung, the connections, which must be twisted, can be soldered. Connect one copper wire to the bell and the other terminal, which must be an iron wire, to the other post of the bell. The apparatus is then short-circuited, yet there is no current in the instrument until

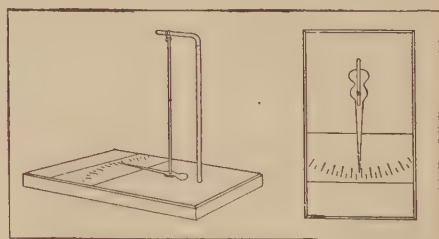
a lighted match, or, better still, the flame of an alcohol lamp is placed at one end only.

Best results are obtained by putting ice or cold water on one side and a flame on the other. The experimenter may also place the whole apparatus under sink faucets with the hot water turned on at one terminal and the cold water at the other. The greater the difference of temperature in the two terminals, the more current will be obtained.

Very interesting experiments may thus be performed, and these may lead to the solving of the great thermoelectric problem.

How to Make a Hygrometer

Mount a wire on a board which is used for a base and should be $\frac{3}{8}$ by 4 by 8 in., as shown in the sketch. A piece of catgut—a string used on a violin will do—is suspended from the bent end of the wire. A hand or pointer is cut from a piece of tin and secured to the catgut string about $\frac{1}{2}$ in. from the base. A small piece of wood and some glue will fasten the pointer to the string. The scale is



Simple Hygrometer

marked on a piece of cardboard, which is fastened to the base and protected with a piece of glass.—Contributed by J. Thos. Rhamstine.

Softening Leather in Gloves and Boots

The leather in high-top boots and gauntlet gloves may be softened and made waterproof by the use of plain mutton tallow. Apply hot and rub in well with the fingers.

Make This Kicking-Mule Toy

By HERBERT C. McKAY

EVERY child is familiar with Si Perkins and his mule "Maud." There are few toys that are simpler to construct than Maud and none that will hold the interest of the child longer. While the outlines of the various parts were made upon $\frac{1}{2}$ -in. section paper, the exact proportions need not be followed closely. In fact, the whole design may be readily adapted to other forms of toys. Only Maud's reputation among the children led to her being adopted.

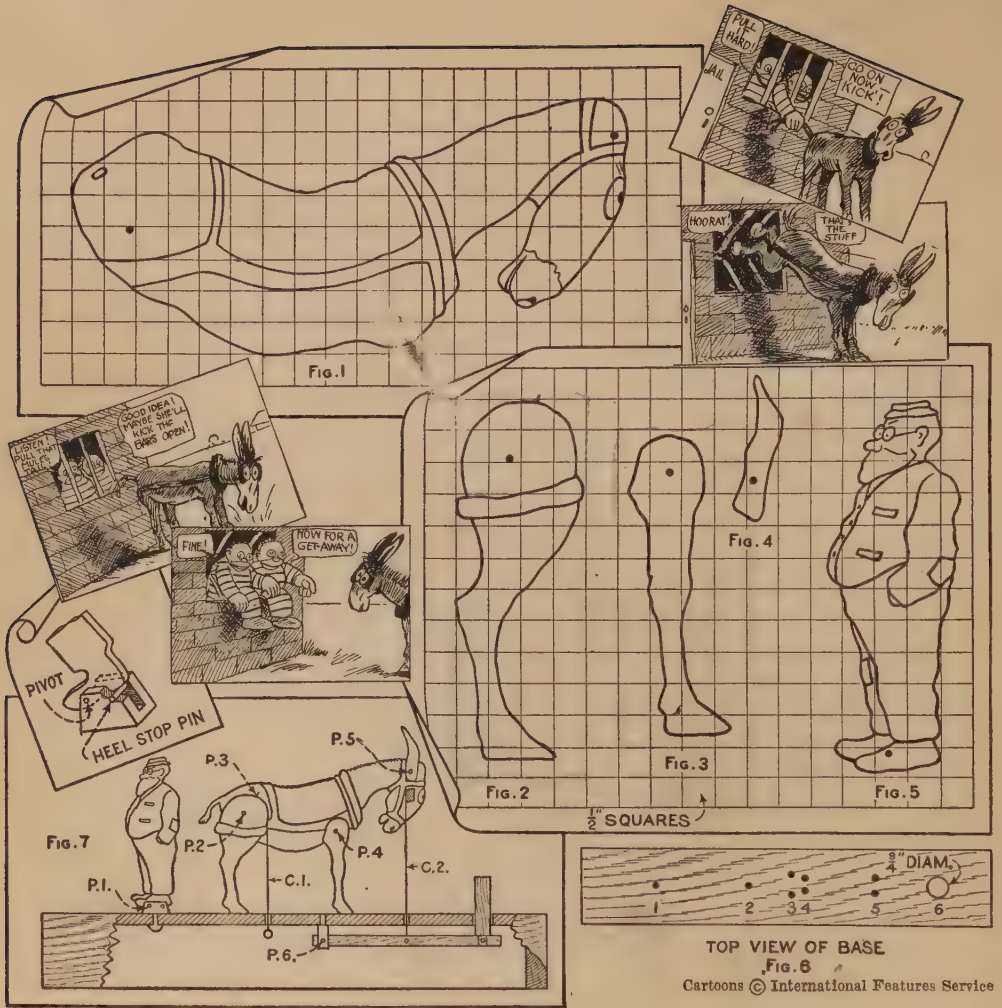
The material used should be plywood or, if this is not procurable, some soft, tough wood that does not split easily. The drilling and the strain incident upon operating the toy make easily splitting woods unsuitable. The parts should be sawed from the wood, sanded, drilled, enameled and varnished before assembly. A hard-drying varnish must be used, so that the parts will move smoothly without sticking; the joints should be free, yet no excessive

play allowed. The wood itself should not exceed $\frac{3}{8}$ in. in thickness, and $\frac{1}{4}$ in. would be even better. Fig. 1 is the body of the mule. Note that all limbs and appendages are lacking. The oval hole in the hip region is pierced for the tail. In addition, three holes are drilled for the pivot joints for hind and forelegs and ears. The harness and features are painted with enamel. The body color is a dun brown, the harness some bright color, such as yellow, the nose pink, the eye white and the other indicated features in black. Fig. 2



Cartoons © International Features Service

"Si" and "Maud," the Well-Known Kicking Mule, Will Keep the Youngsters Amused for Hours at a Time



is the hindleg pattern. Two of these are needed. The color scheme is the same as for the body, although the feet may be painted white, if desired. The fetlocks are painted with short black strokes. A hole is drilled as indicated. An ordinary dressing pin, cut off about $\frac{3}{8}$ in. below the head, is driven into the edge of the leg at the point shown. Fig. 3 is the pattern for the forelegs. They are drilled as shown and painted like the hindlegs. The ears, Fig. 4, are drilled and painted in some bright color. This is unnatural, of course, but will please the children.

Si himself is made as shown in Fig. 5. This is the most intricate figure to saw and color, but by following the pattern it will not be difficult. The coloring may be done according to taste, but bright and

inharmonious paints give the best effect. The outline about the hat has not been carelessly drawn. If a brim were left on the hat, it would be broken almost immediately. The general appearance of the figure is immaterial as long as it leaves a solid enduring form. In the original, eyes, beard and shirt collar were white, the shirt a light blue, the vest bright red with black polka dots, the trousers dark blue with green and yellow patches, the shoes black and the face a reddish orange. A hole is drilled in one foot, as indicated.

When these parts are completed, the base is made. This is a board, 5 in. wide and 2 ft. long, and is shown in Fig. 6. In this base nine holes are drilled. These holes may be identified by the numbers appearing directly below them. Their ex-

act spacing should be determined by placing the completed and assembled figures upon the base and then marking the base accordingly. No. 1 is for the screw which holds Si's support in place; No. 2 is a $\frac{1}{16}$ -in. hole through which passes the kicking cord (C1, Fig. 7); No. 3 are for the screws which secure the lever supports; No. 4 for the screws which hold the forelegs in place; No. 5 are two holes for the bridle reins (C2, Fig. 7), and No. 6 is $\frac{3}{4}$ in. in diameter, in which is placed the stump holding the bucket of oats.

The stump is a roughly round plunger, painted brown and gray, which will just slip easily into the hole provided. The top is shaped to represent a bucket or tub. This rests upon the end of the lever. The entire mechanism, as shown in Fig. 7, consists of two supports between which is pivoted the end of a long lever. These parts need not be made to dimensions, as the principle of action may be easily seen. A cord is fastened to one ear of the mule, below the ear pivot. This cord passes through one of the holes, 5, in the base, around and below the lever, up through the other hole, and finally is fastened to the second ear.

Further, a cord is fastened to the pin in one hindleg and taken through the hole, No. 2, in the base. There, it is passed through an ordinary button, back through the same hole and is fastened to the pin in the other leg. The button should hang about $\frac{1}{4}$ in. below the base. Next, a semicircular support is cut from the plywood and screwed to the upper part of the base behind the mule. The exact position should be determined by trial. The figure of Si is secured to this support as shown. His feet must be far enough above the base so that he will fall freely without digging his toes into it, and a stop pin pro-

vided under the heel, so he will stand upright, as shown in the detail. Small pieces of black paper glued to the bridle reins provide blinders, while several lengths of common cord, passed through the tail opening and tied, make the tail. Supports for the base complete the toy.

When the oat bucket is suddenly pushed, the bridle reins are pulled down, bringing the mule's head down while the ears remain perpendicular. This gives the appearance of the ears being laid back. At the same time, the hindquarters of the body, which is pivoted at P4, will rise, but since the cord C1 prevents the tops of the hindlegs from following, they will turn upon the pivot P2, and the heels will kick out and strike Si. Being pivoted at P1, he falls upon his face.

As soon as the pressure is released, a coil spring (not shown), hooked between the base and the lever, pulls the latter back into place, and Maud assumes her original position automatically. But Si must be helped to his feet again.

Kink for Hanging Pictures

I had occasion to hang a number of pictures without aid, so I used the old plumb idea by hanging a string, weighted at the lower end, above the picture by means of a thumb-tack. When the string crosses the picture at the center on both sides of the frame, the picture is correctly hung.—H. R. Wallin, Tampico, Mexico.



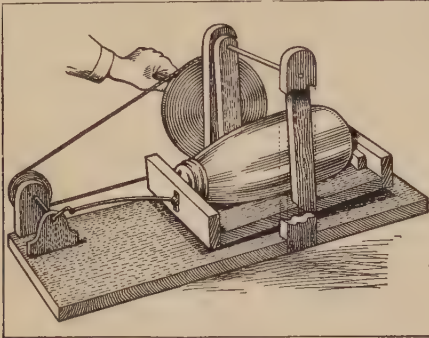
Using the Plumb Idea to Hang Pictures Straight on the Wall

¶ You can make your own auto polish at a big saving by adding 1 pt. of paraffin oil to 1 gal. of pure turpentine, $3\frac{1}{2}$ oz. of citronella and $1\frac{1}{2}$ oz. of cedar oil already mixed;

shake frequently while using the polish and dust the car well before applying. This polish is hard to beat.

Home-Made Small Churn

Many people living in a small town or in the suburbs of a city own one



Making Butter

cow that supplies the family table with milk and cream. Sometimes the cream will accumulate, but not in sufficient quantities to be made into butter in a

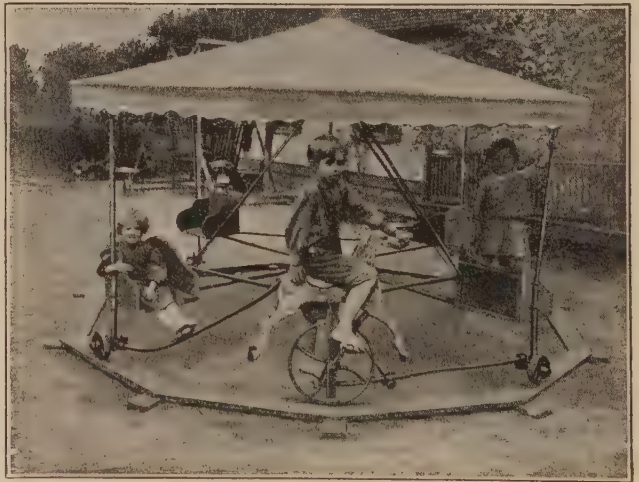
large churn. A fruit jar usually takes the place of a churn and the work is exceedingly hard, the jar being shaken so the cream will beat against the ends in the process of butter-making. The accompanying sketch shows clearly how one boy rigged up a device having a driving wheel which is turned with a crank, and a driven wheel attached to an axle having a crank on the inner end. This crank is connected to a swinging cradle with a wire pitman of such a size as to slightly bend or spring at each end of the stroke. The cradle is made with a cleat fastened to each end, between which is placed the fruit jar, partially filled with cream. The jar is wedged in between the cleats and the churning effected by turning the crank.—Contributed by Geo. E. Badger, Mayger, Oregon.

Home-Made Round Swing

Gas pipe and fittings were used wherever possible in the making of the swing as shown in the photograph. The diagram drawing shows the construction. A 6-in. square cedar post is set in the ground about 3 ft., allowing 2 ft. to remain above the ground and a $\frac{7}{8}$ -in. piece of shafting is driven into the top part of this post for an axle. A cast-iron ring, or, better still, a heavy wheel with four spokes of such a size as to be drilled and tapped for $\frac{1}{2}$ -in. pipe is used for the hub, or center on which the frame swings. If a wheel is selected, the rim must be removed and only the spokes and hub used. The hole in the hub must be $\frac{7}{8}$ in. or less, so the hub can be fitted to the shafting that is driven in the post. A large washer is placed on top of the post and the hub or cast-iron ring set on the washer.

The drilled and tapped holes in the four spokes are each fitted with a $4\frac{1}{2}$ -ft. length of $\frac{1}{2}$ -in. pipe. These pipes are

each fitted with a tee on the end and into this tee uprights of $\frac{1}{2}$ -in. pipe in suitable lengths are screwed, and also



The Merry-Go-Round Complete

short lengths with a tee and axle for the 6-in. wheel are fitted in the under side of the tee. The uprights at their upper ends are also fitted with tees and each joined to the center pipe with $\frac{1}{2}$ -in. pipe flattened on the inner end and fastened with bolts to a flange.

The bottom part of the cloth cover-

ing is held in place by a $\frac{1}{2}$ -in. pipe, bent to the desired circle. Four braces made from $\frac{1}{2}$ -in. pipe connect each spoke and seat to the flange on the center pipe. An extra wheel 18 in. in diameter is fitted in between two seats and used as the propelling wheel. This wheel has bicycle cranks and pedals and carries a seat or a hobby horse. The four seats are fastened to the four pipes with $\frac{1}{2}$ -in. pipe clamps.

Small miniature electric lights are fastened to the overhead braces and supplied with electric current carried through wires to the swing by an ingenious device attached to the under side of the cast-iron ring or hub of the wheel. A ring of fiber on which two brass rings are attached is fastened to the hub and connections are made to the two rings through two brushes fastened to the post with a bracket. The wires run under the surface of the ground outside and connected to the source of electricity. The wires from the brass rings run through the center pipe to the top and are connected to the lamp sockets.

Old-Time Magic

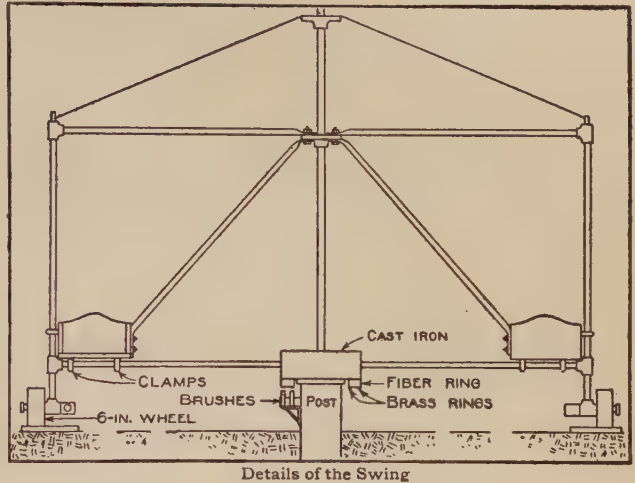
The Disappearing Coin

This is an uncommon trick, entirely home-made and yet the results are as startling as in many of the professional tricks. A small baking-powder can is employed to vanish the coin, which should be marked by one of the audience for identification. Cut a slot in the bottom on the side of the can, as shown in Fig. 1. This slot should be just large enough for the coin that is used to pass through freely, and to have its lower edge on a level with the bottom of the can.

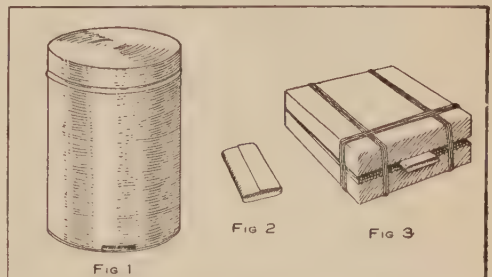
The nest or series of boxes in which the coin is afterwards found should consist of four small sized flat paste-board boxes square or rectangular

shaped and furnished with hinged covers. The smallest need be no larger than necessary to hold the coin and each succeeding box should be just large enough to hold the next smaller one which in turn contains the others.

A strip of tin about 1 by $1\frac{1}{4}$ in. is



bent in the shape as shown in Fig. 2 to serve as a guide for the coin through the various boxes. This guide is inserted about $\frac{1}{8}$ in. in the smallest box between the cover and the box and three rubber bands wrapped around the box as indicated. This box is then enclosed in the next larger box, the guide being allowed to project between the box and the cover, and the necessary tension is secured by three rubber bands around the box as before. In like manner the remaining boxes are



Appliances for the Disappearing Coin

adjusted so that finally the prepared nest of boxes appears as in Fig. 3.

The coin can easily be passed into the inner box through the tin guide,

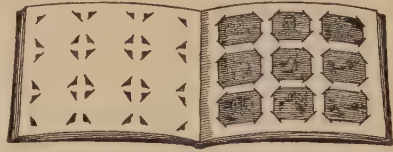
then the guide can be withdrawn which permits the respective boxes to close and the rubber bands hold each one in a closed position.

The performer comes forward with the tin can in his right hand, the bottom of the can in his palm with the slot at the right side. He removes the cover with the left hand and passes his wand around the inner part of the can which is then turned upside down to prove that it contains nothing. The marked coin is dropped into the can by some one in the audience. The cover is replaced and the can shaken so the coin will rattle within. The shaking of the can is continued until the coin has slipped through the slot into his palm. The can is then placed on the table with his left hand. Then apparently he looks for something to cover the can. This is found to be a handkerchief which was previously prepared on another table concealing the nest of boxes. The coin in the right hand is quickly slipped into the guide of the nest of boxes, which was placed in an upright position, and the guide withdrawn, and dropped on the table. The performer, while doing this, is explaining that he is looking for a suitable cover for the can, but as he cannot find one he takes the handkerchief instead. The handkerchief is spread over the can and then he brings the nest of boxes. He explains how he will transfer the coin and passes his wand from the can to the boxes. The can is then shown to be empty and the boxes given to one in the audience to be opened. They will be greatly surprised to find the marked coin within the innermost box.

How to Keep Film Negatives

There are many devices for taking care of film negatives to keep them from curling and in a place easily accessible. Herewith is illustrated a method by which anyone can make a place for the negatives produced by his or her special film camera. The device is made up similar to a post card album with places cut through each leaf to admit each corner of the

negatives. The leaves are made from white paper and when the negatives are in place the pictures made on them can

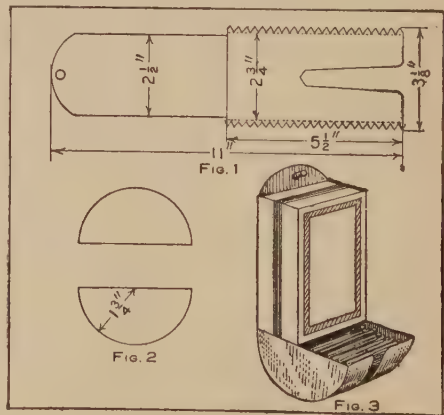


Negatives on White Paper Background

easily be seen through to the white paper background. These leaves can be made up in regular book form, or tied together similar to a loose-leaf book, thus adding only such pages as the negatives on hand will require.—Contributed by H. D. Harkins, St. Louis, Mo.

Home-Made Match Safe

Cut a piece of tin in the shape and with the dimensions shown in Fig. 1. Bend the saw-toothed edges at right angles to the piece on the dotted lines. Bend the part that is marked $5\frac{1}{2}$ in. in a half circle. Make a circle $3\frac{1}{2}$ in. in diameter on another piece of tin, cut



Details of the Match Safe

out the circle and cut the disk in two as shown in Fig. 2. These half circle pieces are soldered to the sides of the teeth of the half circle made in the long piece of tin. Remove one end from the inside box containing matches and slip the back of the match safe through between the bottom of the inside box and the open end box that

forms the cover. The matches will fall into the half circle tray at the lower end of the box which will be kept full of matches until they are all used from the box.—Contributed by C. F. White, Denver, Colo.

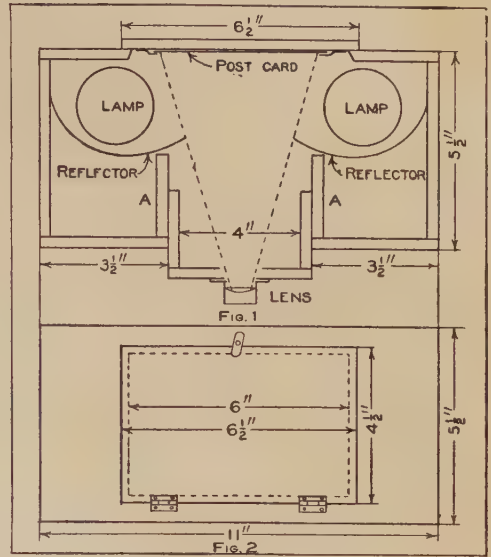
An Electric Post Card Projector

A post card projector is an instrument for projecting on a screen in a darkened room picture post cards or any other pictures of a similar size. The lantern differs from the ordinary magic lantern in two features; first, it requires no expensive condensing lens, and second, the objects to be projected have no need of being transparent.

Two electric globes are made to cast the strongest possible light on the picture card set between them and in front of which a lens is placed to project the view on the screen, the whole being enclosed in a light-tight box. The box can be made of selected oak or mahogany. The lens to be used as a projector will determine the size of the box to some extent. The measurements given in these instructions are for a lens of about 5 in. focal length. The box should be constructed of well-seasoned wood and all joints made with care so they will be light-tight.

The portion shown carrying the lens in Fig. 1 is made to slide in the main body of the lantern for focusing. A box should first be made 5½ in. wide, 5½ in. high and 11 in. long. A hole is cut in the back of the box 4 by 6 in. represented by the dotted line in Fig. 2. This will be ¾ in. from the top and bottom and 2½ in. from each end of the outside of the box. Two strips of wood ½ in. wide and 6½ in. long are fastened along the top and bottom of the back. The door covering this hole in the back, and, which is also used as a carrier for the post cards, is made from a board 4½ in. wide and 6½ in. long. The door is hinged to the lower strip and held in position by a turn button on the upper strip. The slides for the picture cards are made from strips of tin bent as shown, and tacked to the inside surface of the door.

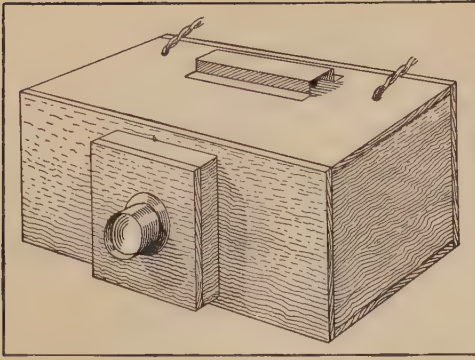
The runners to hold the part carrying the lens are two pieces 2¼ in. wide by 5 in. long and should be placed ver-



Details of the Post Card Lantern

tically, AA, as shown in Fig. 1, 3½ in. from each end. An open space 4 in. wide and 5 in. high in the center is for the part carrying the lens to slide for focusing. The part carrying the lens is a shallow box 4 by 5 in. and 2 in. deep in the center of which a hole is cut to admit the lens. If a camera lens is used, the flange should be fastened with screws to the front part of this shallow box. The sides of this box should be made quite smooth and a good, but not tight, fit into the runners. Plumbago can be rubbed on to prevent sticking and to dull any rays of light.

Two keyless receptacles for electric globes are fastened to the under side of the top in the position shown and connected with wires from the outside. Two or three holes about 1 in. in diameter should be bored in the top between and in a line with the lights. These will provide ventilation to keep the pictures from being scorched or becoming buckled from the excessive heat. The holes must be covered over on the top with a piece of metal or wood to prevent the light from showing on the ceiling. This piece should not be more than ½ in. high and must



Post Card Lantern Complete

be colored dead black inside to cause no reflection.

The reflectors are made of sheet tin or nickel-plated metal bent to a curve as shown, and extending the whole height of the lantern. The length of these reflectors can be determined by the angle of the lens when covering the picture. This is clearly shown by the dotted lines in Fig. 1. The reflectors must not interfere with the light between the picture and the lens, but they must be sufficiently large to prevent any direct light reaching the lens from the lamps. In operation place the post card upside down in the slides and close the door. Sliding the shallow box carrying the lens will focus the picture on the screen.

A Handy Calendar

"Thirty days hath September, April, June and November," etc., and many other rhymes and devices are used to aid the memory to decide how many days are in each month of the year. Herewith is illustrated a very simple method to determine the number of days in any month. Place the first finger of your right hand on the first knuckle of your left hand, calling that knuckle January; then drop your finger into the depression between the first and second knuckles, calling this February; then the second knuckle will be March, and so on, until you reach July on the knuckle of the little



The Knuckles Designate the 31-Day Months

finger, then begin over again with August on the first knuckle and continue until December is reached. Each month as it falls upon a knuckle will have 31 days and those down between the knuckles 30 days with the exception of February which has only 28 days.—Contributed by Chas. C. Bradley, West Toledo, Ohio.

The Fuming of Oak

Darkened oak always has a better appearance when fumed with ammonia. This process is rather a difficult one, as it requires an airtight case, but the description herewith given may be entered into with as large a case as the builder cares to construct.

Oak articles can be treated in a case made from a tin biscuit box, or any other metal receptacle of good proportions, provided it is airtight. The oak to be fumed is arranged in the box so the fumes will entirely surround the piece; the article may be propped up with small sticks, or suspended by a string. The chief point is to see that no part of the wood is covered up and that all surfaces are exposed to the fumes. A saucer of ammonia is placed in the bottom of the box, the lid or cover closed, and all joints sealed up by pasting heavy brown paper over them. Any leakage will be detected if the nose is placed near the tin and farther application of the paper will stop the holes. A hole may be cut in the cover and a piece of glass fitted in, taking care to have all the edges closed. The process may be watched through the glass and the article removed when

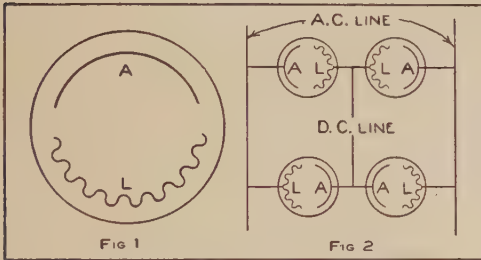
the oak is fumed to the desired shade. Wood stained in this manner should

not be French polished or varnished, but waxed.

The process of waxing is simple: Cut some beeswax into fine shreds and place them in a small pot or jar. Pour in a little turpentine, and set aside for half a day, giving it an occasional stir. The wax must be thoroughly dissolved and then more turpentine added until the preparation has the consistency of a thick cream. This can be applied to the wood with a rag and afterward brushed up with a stiff brush.

How to Make an Electrolytic Rectifier

Many devices which will change alternating current to a direct current



Electrolytic Rectifier and Connections

have been put on the market, but probably there is not one of them which suits the amateur's needs and pocket-book better than the electrolytic rectifier.

For the construction of such a rectifier four 2-qt. fruit jars are required. In each place two electrodes, one of lead and one of aluminum. The immersed surface of the aluminum should be about 15 sq. in. and the lead 24 sq. in. The immersed surface of the lead being greater than that of the aluminum, the lead will have to be crimped as shown in Fig. 1. In both Fig. 1 and 2, the lead is indicated by L and the aluminum by A.

The solution with which each jar is to be filled consists of the following:

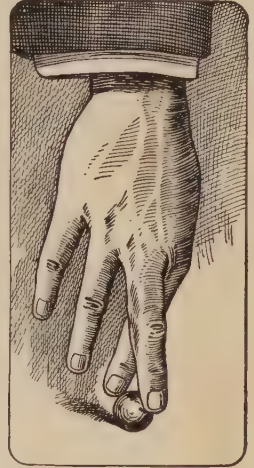
Water	2 qt.
Sodium Carbonate.....	2 tablespoonfuls
Alum	3 tablespoonfuls

Care should be taken to leave the connections made as shown in Fig. 2. The alternating current comes in on the wires as shown, and the direct current is taken from the point indicated.

The capacity of this rectifier is from 3 to 5 amperes, which is sufficient for charging small storage batteries, running small motors and lighting small lamps.—Contributed by J. H. Crawford, Schenectady, N. Y.

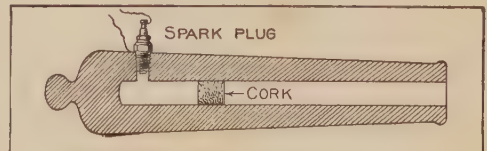
The Rolling Marble

Take a marble and place it on a smooth surface, the top of a table will do. Ask some one to cross their first and second fingers and place them on the marble as shown in the illustration. Then have the person roll the marble about and at the same time close the eyes or look in another direction. The person will imagine that there are two marbles instead of one.



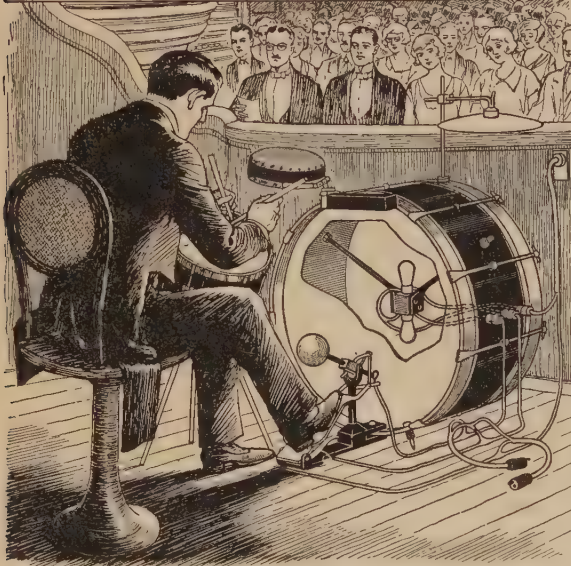
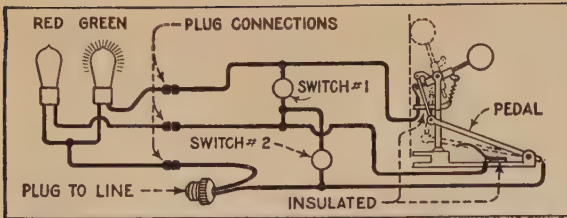
A Gas Cannon

If you have a small cannon with a bore of 1 or 1½ in., bore out the fuse hole large enough to tap and fit in a small sized spark plug such as used on a gasoline engine. Fill the cannon with gas from a gas jet and then push a



Gas Cannon Loaded

cork in the bore close up to the spark plug. Connect one of the wires from a battery to a spark coil and then to the spark plug. Attach the other wire to the cannon near the spark plug. Turn the switch to make a spark and a loud report will follow. Contributed by Cyril Tegner, Cleveland, O.



Colored Electric Lights Operated by the Pedal of an Orchestra Bassdrum Increase the Jazzy Effect of the Music

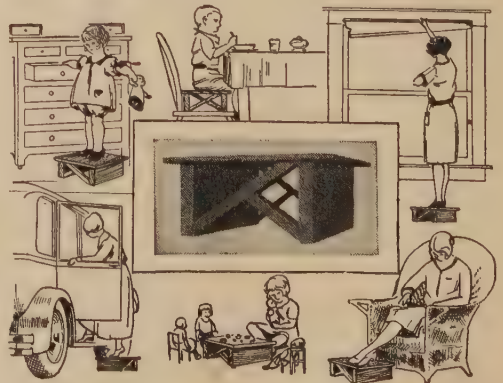
Novel Lighting Effect for Jazz-Orchestra Bassdrum

Many bassdrums have colored lights in them which flash on and off by the use of a thermostatic device. This control, however, causes the lights to operate at definite intervals. A variety of colors and unexpected flashes may be obtained by wiring the pedal into the circuit as indicated. When the pedal goes down, a connection is made which causes one color to show, and when it comes up again another connection lights up the second lamp. Various combinations may be produced by putting two switches into the circuit, as shown in the wiring diagram. If switch No. 2 is closed, one light will burn steadily and independently of the pedal. If switch No. 1 is closed, both lights will burn steadily. If both switches are open, the lights will alternate when the pedal is operated. If No. 2 is open and No. 1 closed, both lights operate to-

gether when the pedal is pressed and also when it is released. The effect produced is also dependent upon the drummer as he plays the music and can be varied by stopping the pedal before it comes up far enough to make contact. The lamps and sockets are suspended in the middle of the drum as indicated. There must be three electric wires on the inside to make connection with the three on the outside. This is done by the use of radio plugs. As shown in the wiring diagram, the contact springs must be insulated from the pedal.—J. L. Sevedge, Lafayette, Ind.

Handy All-Purpose Stool

For general use about the house, one will find the small stool shown in the photo quite convenient. Some of its uses are shown in the details. When placed on the seat of an ordinary chair, it brings the child up to his plate at the table. It is just right for a footstool and as a step to get at the window shade or the pantry shelf. It comes handy for grandma when she is getting into the car. With a cushion on it, it makes an excellent seat for a child as it takes up only a little space in the car. It makes a fine table for the children's tea party and when placed on a chair it can be used as a typewriter stand.—Leslie H. Phinney, Springfield, Mass.



Small Wooden Stool of General Utility about the House and in the Automobile

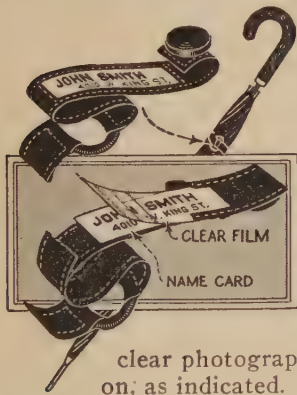
Remedy for a Leaky Chimney

In the rooms immediately below the chimney there was occasional evidence of a leak during heavy rains. Repeatedly roof men made repairs which were intended to correct the trouble, but the leak persisted. Finally it was observed that no leak appeared during those months of the year when the heating system was operating, no matter how hard the rain. From this fact it was discovered that a few porous bricks in the chimney right at the roof line were causing all the trouble. The water was working its way into the bricks and completely around the flashing. When the chimney was in use, the heat apparently dried the water out faster than it could soak through the bricks. Painting the bricks at the roof line with a heavy roof paint remedied the trouble.—L. I. Thomas, Oak Park, Ill.

Identification Tags on Umbrellas

Umbrellas are often lost and as they are not usually provided with identification tags, they are not returned to their owners. The tag shown in the drawing has

been found handy and it is not in the way. It is attached to the band used to tie up the umbrella. The band is cut out on the inside and a piece of paper covered with



clear photographic film is sewed on; as indicated. After the name is printed on it with ink the paper should be waterproofed by soaking it in linseed oil.

Spooks in the Dark

Many spirit mediums use luminous paint in various ways in the production of scenes. Here is one of their tricks, which anyone can duplicate, and it will be the cause of much merriment as a practical joke, especially at Halloween time. The effect is that of a luminous face and hands

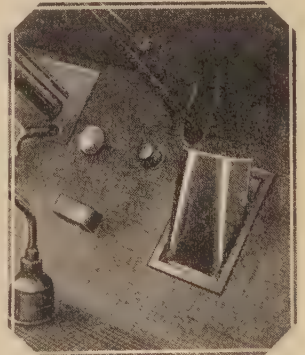


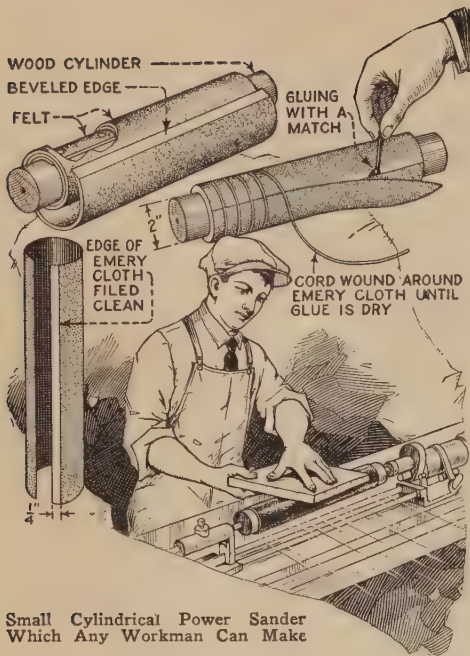
Luminous Paint Makes a "Glove Monkey" Appear as a Spook in the Dark

floating through the air and finally disappearing. The hands and face move about naturally, the hands making gestures and the head nodding in reply to questions. Get a "glove monkey," which is made to be operated by one hand. Cover the hands, face and ears with luminous paint, being careful to place black lines between the fingers on the hands. The eyes and mouth are also left black. Expose it to the light five minutes before demonstrating in the dark. It is covered with a black cloth or uncovered to make it disappear or reappear.—Bronaldo Murray, Sturgis, Michigan.

Deflector for Auto Heater

The photo shows a deflector for an auto heater. It is easy to make and costs little. A piece of galvanized iron, 5 by 8 in., is used. It is bent to the shape shown and fastened to the floor under the mat by means of screws and small nails. It keeps the stream of warm air from passing directly to the passenger's face and spreads it over the car.





Small Cylindrical Power Sander
Which Any Workman Can Make

Power Sander for Home Workshop

Often it is necessary for the home mechanic to do some sanding in his shop and, if he has a lathe, a cylindrical sander can be made in a few moments. Turn down a roller, about 2 in. in diameter and 10 or 12 in. long. Tack a piece of felt cloth on, as shown in the upper left-hand detail, and bevel the edge of the felt with a wire brush or with a coarse file, so that there will be no ridge when the felt is wrapped around the roller in the direction opposite to that in which the lathe turns. This will prevent the felt from coming loose. A piece of emery cloth is cut out to fit snugly over the roll, allowing $\frac{1}{4}$ in. for gluing, as shown in the lower left detail, and is filed clean, so that the glue will readily adhere to it. The inner side of the other edge of the emery cloth is stuck over the cleaned portion after the glue is applied, which can be done with a match. To keep the emery cloth on the roller until the glue is dry, wind some heavy cord around it, as shown in the upper right-hand detail. Be sure that the emery cloth overlaps in the same direction as the felt, in order to prevent it from being torn while sanding. The use of sandpaper instead of emery cloth is not advised, as it

tears quickly and has to be replaced so often. The felt provides just enough resiliency to protect the emery cloth and make the sanding operation easy.—E. R. Haan, Chicago, Ill.

Paraffin Wax Keeps Paper Clean

I had occasion to make a chessboard recently and, having some heavy white drawing board on hand, I drew the squares and filled them in alternately with black India ink. While making the board, I knew that it would soil easily, but by the time the board was finished I hit upon an idea to prevent the white from showing dirt, or rather a way to prevent dust and dirt from collecting upon it, by rubbing it with paraffin wax. Now, after considerable usage, it is still in fine shape and as white as when I made it. I have found that this is an excellent method of keeping drawings and all sorts of cards clean that have to be handled much.—Edward H. Flaharty, Parco, Wyo.

Novel Use for Drain Tile

The accompanying photo shows a novel use for drain tile. The two pillars on the porch and the pot in the center of the lawn are made of 18-in. glazed tile. The pillars have blocking inside, to help support the weight of the porch roof.—Gordon H. Sears, Holliday, Utah.



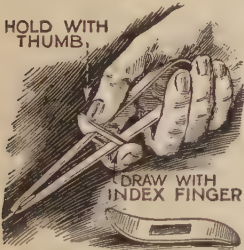
Glazed Drain Tile Can Be Used Successfully as
Porch Pillars

New Arrangement for Stamp Album

Collectors of postage stamps are always on the lookout for new methods of arranging their specimens, so that their stamp albums may be made more interesting. Here is a novel scheme which does not require any change in the regular layout. Eliminating the half and one-and-one-half values of the present issue of United States stamps, select good copies of the precanceled kind bearing the post marks of the ten largest American cities. Mount these numerically, each bearing the name of a city according to its rank. Thus the one-cent stamp would stand for New York, the two-cent stamp for Chicago, and so on, until the tenth denomination, representing the tenth city in size. The whole set may be arranged accordingly. Previous issues, or those of foreign countries, may be mounted in the same order, arranging the stamps in the position the cities held at the time that the stamps were current.—Charles E. Forgette, Plattsburg, N. Y.

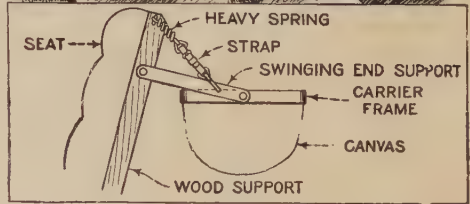
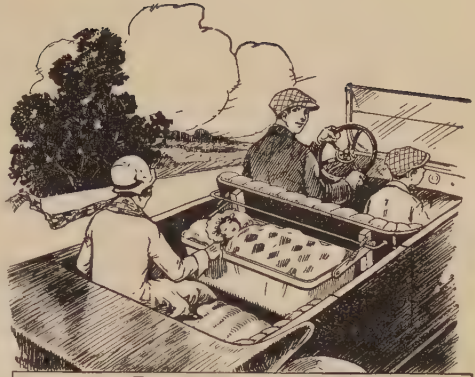
Powerful Tweezers Simply Made

An unusual type of tweezers for light work, which has an extraordinarily firm grip, is shown in the illustration. It will be found especially useful when the pressure must be maintained for a considerable length of time. The tool resembles the conventional type, except that a link is passed over the legs. Holding the upper end of the link with the thumb, and drawing back on the lower end with the index finger, as shown, produces a powerful grip at the points.



Baby Carrier for Small Autos

Most baby carriers for the automobiles are made for larger cars and as I could not buy one that would be suitable in my Chevrolet touring car, I made the one shown in the illustration. A strip of 1/2-in. strap iron, bent to a rectangular form,

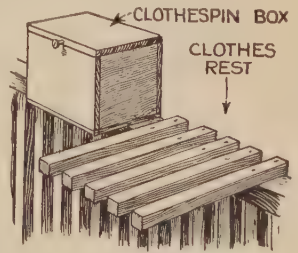


Homemade Baby Carrier Which Fits behind the Front Seat in Any Small Auto

about 14 in. by 2 1/2 ft., makes the frame for the carrier. The overlapping ends are drilled and fastened with screws. A 1/4-in. hole is drilled through the center of the ends, so that the frame can be pivoted on two supports, which are also made of strap iron. These supports are arranged so that they will swing a little on a vertical wooden support, and a heavy spring and strap hold them in position. Details of the construction can readily be seen.—Guy E. Clark, Everett, Wash.

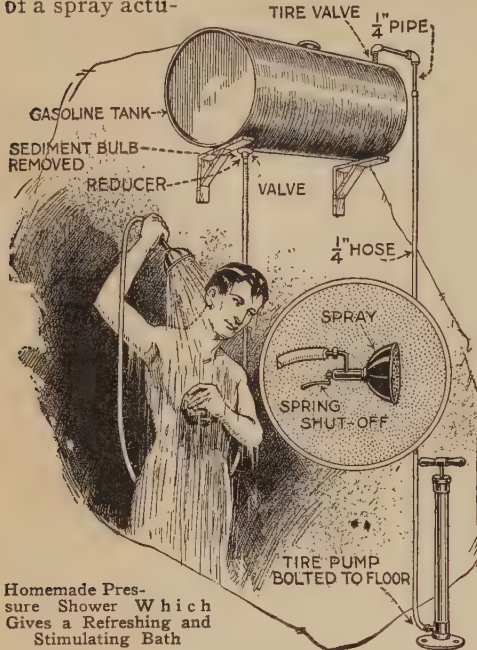
Reducing Labor of Hanging Clothes

When clothes are hung on the line, one's back soon begins to ache from stooping so often to pick up the clothes out of a basket and then to gather up the clothespins. To do away with this trouble, it is a good idea to provide a rack of suitable height for both the clothespin box and the clothes basket on a near-by fence or attached to the clothesline pole.—F. Ellis White, Brockton, Mass.



An Improvised Pressure Shower Bath

Portable shower baths usually consist of a spray actu-



Homemade Pressure Shower Which Gives a Refreshing and Stimulating Bath

ated only by the fall of the water from overhead by gravity. These do not stimulate the skin and circulation like the needle baths, and a shower that will approach the qualities of the latter can be made by the home mechanic at slight expense. Arrange a shelf for a tank near or over the bathtub and low enough so that the tank can be readily filled with water. It is a discarded automobile gas tank of the kind that can be sealed so that it will withstand a few pounds of air pressure. Set the tank on the shelf and clamp it in place securely. Drill a hole in the top near one end and solder in a tire valve. Connect this with two elbows and two short pieces of $\frac{1}{4}$ -in. pipe, so that one piece points down alongside the tank. Then remove the sediment bulb from the outlet underneath and substitute a shut-off valve and nipple, or reducer, as shown. Drill two holes in the foot of a tire pump, screw the latter to the floor beneath the air-valve inlet and connect the two with a $\frac{1}{4}$ -in. rubber hose. Connect a sufficiently long piece of wire-wound pressure hose to the valve under the tank and fit the other end with a spring shut-off

valve, such as can be taken from a discarded farm-spray outfit. To the end of this attach a spray head. If possible, choose one of a shape that can be hooked over the upper valve stem when not in use and thus be held out of the way. To use the shower, remove the filler plug and pour in water until the tank is three-fourths full. Replace the plug with a rubber gasket to insure a tight seal. Force in air to several pounds' pressure with the pump. The tire valve acts as a check. When ready for the shower, open the tank valve and press the lever on the spring valve next to the spray head. The water will be forced down with enough pressure to give an exhilarating bath. When through, shut off the tank valve to guard against any leaking from the spray and hang the latter over the valve handle, as suggested.—L. B. Robbins, Harwich, Mass.

Removing Stuck Lead from Tip of Refillable Pencil

When the lead becomes jammed at the end of refillable pencils and cannot be driven out, the only remedy is to drill it out. The main objection to this process is that, in the average household or office, a drill of the proper size is not at hand, and even if the regular twist drill of the proper size is used there is always the risk of enlarging the hole so that afterward the lead will wobble. For an emergency drill, get a large-size needle which will slip freely into the bore. Break off the end about halfway down the eye, as indicated, which will give you a two-pronged drill. The best plan is to hold the needle with a



pair of pliers or drive it into the door casing, point first, and, after inserting the eye end in the pencil point, revolve the pencil between the fingers. Clean frequently as the drilling progresses.

Commercial film is developed in the same manner as any other film; the resulting negative can be used for contact printing or enlarging, and if the prints are tinted, they make very attractive pictures that are a decided novelty.



How to Take Care of Your Guns

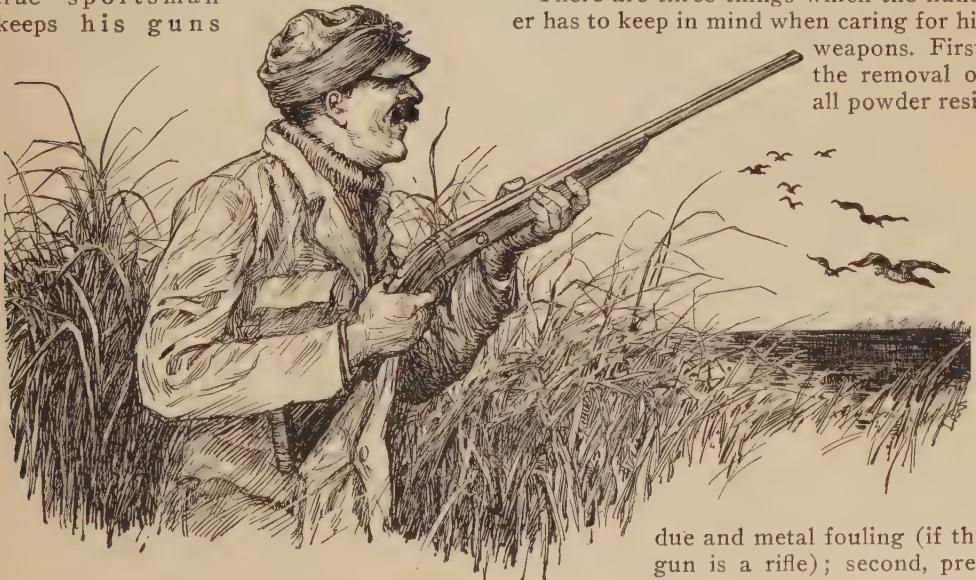
By BOB BECKER

OF all the items in a hunter's outfit nothing requires so much attention as his gun or guns. Rubber boots can be taken off and tossed in a corner. Wet clothing can be hung up to dry without fear of rust or damage. Shells will keep from year's end to another without attention, but once a gun has been used afield the hunter's day is not ended until the weapon has been cleaned thoroughly and properly.

Without question, more shotguns and rifles are partly or completely ruined by lack of attention or unintelligent cleaning than by using the weapons too much. And, in the long run, that precious ingredient known as "elbow grease" is the thing that keeps one's gun rack looking well. A lazy man has dirty guns. The true sportsman keeps his guns

clean and shining and thereby lengthens their life. After using rifles, pistols and shotguns on a variety of game from Alaska on the north to the swampy tropics of the Amazon and Bolivia on the south (where improper or careless cleaning methods quickly and completely ruin a gun), I recommend the following procedure if one wishes to keep his armory full of shining, straight-shooting, unfouled weapons: Never leave your gun dirty overnight, especially if it is both wet and dirty; use patent cleaners equipped with brass-wire gauze if the barrels are very dirty; use a nitro solvent to remove residue in the barrel; don't spare the oil when cleaning any gun or preparing the weapon for storage, and use plenty of elbow grease.

There are three things which the hunter has to keep in mind when caring for his weapons. First, the removal of all powder resi-



due and metal fouling (if the gun is a rifle); second, pre-



vention of rust, and third, proper oiling. The first is the most difficult feat and the one in which most gun owners fail.

To clean a shotgun proceed as follows: Take the gun apart and give attention to the barrel or barrels first of all. If you have been shooting in the rain, wipe off most of the water and then assemble a cleaning rod to attack the residue in the chambers. Here is where a bottle of nitro solvent is of great value. Run a small piece of woolen cloth through the slot in the cleaning rod, moisten it thoroughly with nitro solvent (which can be purchased in practically every sporting-goods store) and vigorously scrub the inside of the barrel. If the gun is particularly dirty, use a brass wire-gauze cleaner after an application of solvent, then dry flannel patches.

After you have run three or four of these flannel patches through the barrel they appear to come out clean, but the wise man will moisten another piece of cloth with nitro solvent and attack the bore again. The result often surprises the gun owner who thinks the chambers are free from fouling, as this second applica-

tion of solvent will often reveal a black stain upon the flannel patches which means that even though the barrels appear bright and shiny, there remains upon the steel an almost invisible wash or plating left by the smokeless powder. All of this must be removed before the gun is oiled and set aside as a finished job. After this solvent treatment, the gun owner should follow with dry pieces of flannel until the last one comes out clean. Then moisten one with a thin gun oil



and scrub the bore in order to leave a coating of protective oil on the steel. If the gun is to be set aside for some time, it is best to finish with a heavy grease. Just to play safe and to make sure that I have removed every speck of fouling from the guns I have used, I always go back to them one or two days after cleaning and check up by running flannel patches through the barrels.

In the care of rifles, even more attention must be given the clean-



ing and oiling job than in treating shotguns. This applies to small-bore guns, such as the .22-caliber, and to the high-power big-game guns, where metal fouling is a factor to be dealt with. In cleaning and caring for a .22 rifle, the most popular small gun in the United States, nitro solvent (No. 9) should be used freely. Use a small woolen rag in a slotted wiper soaked in solvent, or if the fouling has become caked in the bore, pour a small amount of the liquid through the barrel before introducing the cleaning patch. Start the rag from the breech of the gun and not from the muzzle. Another point to keep in mind is that the cleaning patch should be allowed to follow the rifling of the barrel. If you force a swab time after time across the rifling you may ruin it. This means the shooting qualities of your gun are gone, as perfect rifling is essential to accuracy. Likewise, even a slight burr on the muzzle of the arm will impair its accuracy. Hence the rule to clean the bore from the breech and not from the muzzle, where one is likely to inflict a careless knock with the cleaning rod. In cleaning a .22 rifle which, contrary to popular belief, is one of the most difficult bores to keep clean and in perfect condition due to the action of smokeless pow-

der, the gun owner should swab the bore with as many small wool patches as are needed to finish with an unstained piece. The rule is: Use elbow grease until they show white.

Corrosion and not erosion is the menace of high-powered guns and hundreds of finely made guns go into the scrap heap every year because the shooter-owner does



not understand how to combat the corrosion evil, which, in simple language, means that by failure to thoroughly remove the metal and powder fouling in a barrel it is attacked by these steel destroyers and completely ruined.

Ammonia is one of the powerful allies of the rifle owner, if he will only use this common cleaning fluid. Ammonia naturally comes into this cleaning operation because the fouling in the bore of a high-power rifle is usually acid due to the combination of powder and primer explosion. This fouling is very tenacious. No mere scrubbing with woolen rags removes it, nor will the common thin gun oils touch it as a rule. To remove this residue from the bore of a high-power rifle, where there are no lumpy bits of metal fouling, strong ammonia, containing not less than 28 per cent ammonia gas, is required. Thoroughly scrub the bore with several pieces of

wool cloth soaked in this fluid and then run two or three through the barrel to dry it. Follow this treatment with two oily patches, and the bore should be in good shape. However, the next day better repeat this treatment so as to be sure that the barrel is absolutely clean.

The hunter who goes afield to shoot smokeless-powder shells with lead-alloy bullets encounters another difficulty when it comes time to clean his weapon. He must not only remove the fouling which comes from the powder but the lead deposits which have been laid down in the bore by the bullets. This condition is called "leading." Sometimes you will see it in the form of tiny lumps or scales, and sometimes you won't see it at all, as it takes

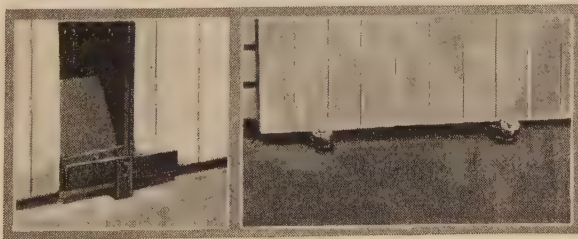
the form of a well-nigh invisible plating. To remedy this condition, first clean the bore with ammonia by scrubbing it thoroughly with pieces of flannel rag soaked in it. Then dry it by running several more patches through the barrel. Next smear several cleaning patches with mercurial ointment and scrub the bore with them, finally running a rag heavily coated with ointment through the barrel so that the bore will be thickly greased when you put it away. After 24 hours this procedure should be repeated.

If a rifle barrel has been neglected for some time and rust has taken hold, there is a chance that the bore may be restored by the use of a metal anti-fouling solution and a rust remover. Place the gun in a vertical position, pour through it 1 qt. or more of boiling-hot soap suds. Then scrub it vigorously with a flannel patch moistened with soapy water. Run two or three dry rags through the bore, and you are ready for the next step.

A rubber cork, which fits the chamber of your rifle snugly, is necessary for this operation. Cork the chamber and then fill it with a metal anti-fouling solution, which your druggist can mix for you. It must be freshly made and kept tightly corked until you feed it to the rusty rifle. The solution is made up as follows: Ammonia containing 28 per cent gas, 3 oz.; water, 2 oz.; ammonium persulphate, $\frac{1}{2}$ oz., and ammonia carbonate, 100 gr.

Keeping Garage Doors Snug

To prevent the sliding garage doors from swinging in the wind, equip them with the features shown in the photo. Two small iron rollers are set near the end, just far enough away to permit the door to move easily back and forth. At the center two broad iron straps are riveted to short iron rods set in the cement. Note that each end of the straps is curved out slightly. This



Fasteners on Sliding Garage Door Prevent It from Swinging in the Wind

This is rather a ticklish solution as it will "eat" your stock if any of it is spilled on the wood. So, watch your step when you are pouring it into the bore. Also, it rusts steel if allowed to evaporate on it. The solution should be left in the bore not more than 30 minutes. Then attack the bore with cleaning patches until it is dry and finally use a new stiff brass-bristle brush to loosen up the fouling that remains. This treatment is then repeated.

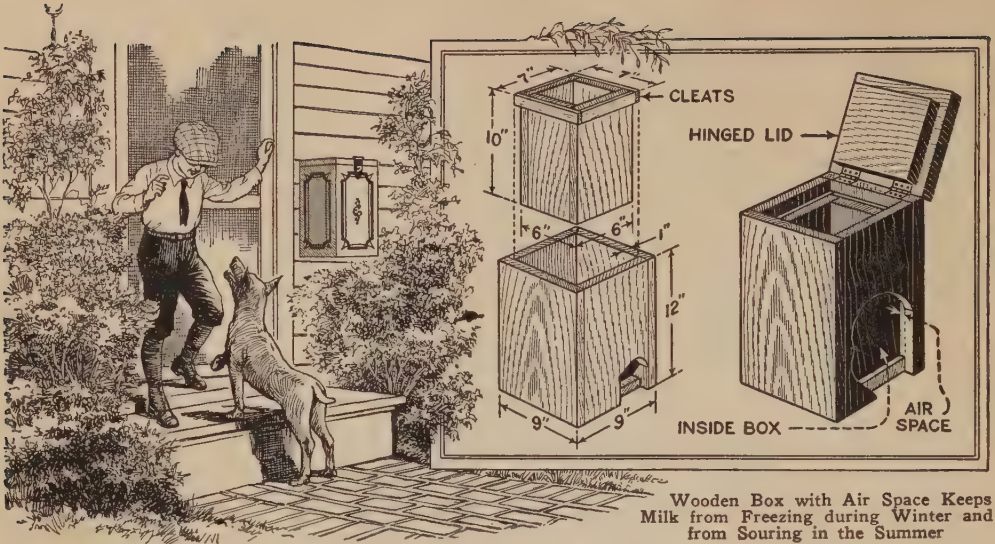
Next comes the use of a rust remover, which can be purchased at a sporting-goods store. Several patches of flannel covered with this dope should be run through the barrel. Use plenty of elbow grease on this operation and then clean the bore with dry patches, oil it up and you are ready to see if the old shooting iron is going to shoot straight or bend bullets around trees. If its shooting qualities are not evident after this operation, better chuck the barrel into the scrap heap and get a new one.

Just one more part of the rifle or shotgun which needs a little attention if you have pride in your gun cabinet. This is the stock. Don't smear it with gun oil if you wish to preserve the luster of its finish. Raw linseed oil, a flannel rag and a minute or two of vigorous rubbing is the successful combination for gunstocks. But for every minute put in on the stock, hours must be expended on the bore and other steel in a gun.

squeeze fastener does not interfere with driving the car in and out and effectively prevents the doors from swinging.

A Register Screen

To prevent pencils, buttons, coins, and the like from falling into the hot-air registers, I cut pieces of ordinary screen - door netting, and fitted them into the openings. They will not interfere with circulation.—F. J. Pease, Wauwatosa, Wis.



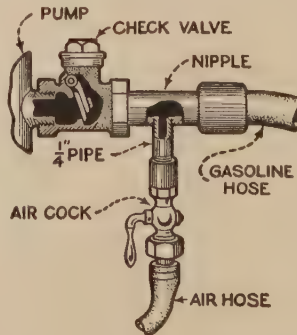
Insulated Box for the Milk Bottle

For years we have had considerable trouble during the winter in preventing our milk from freezing on the porch, and keeping it from souring during the summer, before the bottle was taken into the house. To eliminate this trouble, I made a box out of 1-in. lumber, 9 by 9 in. in outside measurements, and 12 in. deep with the top open. For the inside I made a box without top or bottom, 6 by 6 in. and 10 in. deep, with a rim around the top of sufficient thickness to fill up the space between the two boxes after the smaller one was set firmly into the large one. This left a dead-air space between the two boxes. For the top, I took a 1-in. board, 9 by 9 in. in size, with a 1 in. board tacked underneath it to allow it to slide inside of the larger box at the top. This formed the lid, which permitted it to be opened or shut easily. During the winter, when the weather was 10° above zero, although left out in the open all day, the milk did not freeze, and this summer it has kept nicely with the temperature at 50 and 60°.—W. H. Snyder, Pocatello, Idaho.

Compressed Air Forces Gas from Hose

Gasoline stations owning their pumps can overcome the present method of draining the hose into the auto tank by the use of compressed air. The air is used directly from the tire-filling apparatus and will

force out the last drop of gas from the hose. Disconnect the hose and fit a one-way gate check valve to the connection at the pump, so that no gasoline can be forced back into the pump. Then add a short nipple ahead of this check, drill and tap a 1/4-in. hole in the pipe from the air hose. The gasoline hose can be attached to the end of the large nipple in the regular manner, either by threading on the coupling or by a hose clamp and bolts. A spring shut-off cock should be inserted in the air line at a convenient point at the pump. In use, the gasoline is fed into the automobile tank in the usual manner, but instead of lifting the hose to allow it to drain, the air cock is depressed. This allows the air to flow into the hose and force out the residue, but the check in the gas line prevents the air from forcing the



gas into the pump and back into the supply tank. As soon as the gas is out of the hose, the cock is closed.—L. B. Robbins, Harwich, Mass.

☐ To boil milk without risk of scorching it, the pan should be well rinsed in cold water before putting in the milk.

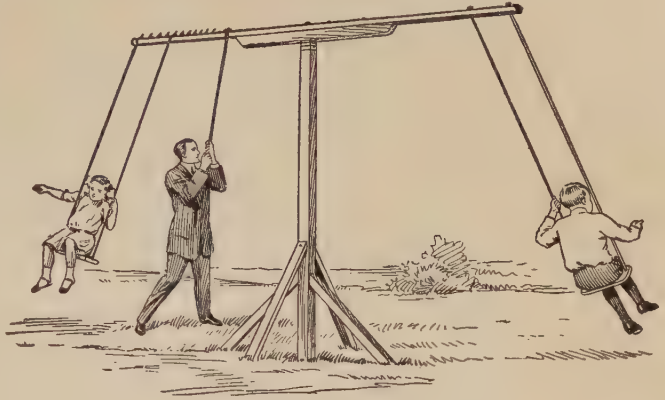
A Merry-Go-Round Thriller

As a home mechanic with a fondness for amusing the children I have seen many descriptions of merry-go-rounds, but never one which required so little material, labor and time, and which gave such satisfactory results, as the one illustrated herewith. It was erected in our back yard one afternoon, the materials being furnished by an accommodating lumber pile, and a little junk, and it has provided unlimited pleasure for "joy-riders," little and big, from all over the neighborhood. It looks like a toy, but once seat yourself in it and begin to go around.

and, no matter what your age or size may be, you will have in a minute enough thrill and excitement to last the balance of the day.

The illustration largely explains itself, but a few dimensions will be a help to anyone wishing to construct the apparatus. The upright is a 4 by 4-in. timber, set 3 ft. in the ground with 8 ft. extending above. It is braced on four sides with pieces 2 in. square and 2 ft. long, butting against short stakes. The upper end of the post is wound with a few rounds of wire or an iron strap to prevent splitting. The cross-piece is 2 in. square, 12 ft. long, strengthened by a piece 4 in. square and 5 ft. long. These two pieces must be securely bolted or spiked together. A malleable iron bolt, $\frac{3}{4}$ in. in diameter and 15 in. long is the pivot. On this depends the safety of the contrivance, so it must be strong enough, and long enough to keep firmly in the post. Drive this bolt in a $\frac{3}{8}$ -in. hole bored in the post, which will make it a sufficiently tight fit. Make the hole for the bolt very loose through the cross-piece, so that there will be plenty of "wobble," as this is one of the mirth-

making features of the machine. Use a heavy washer at the head. The seats are regular swing boards, supported by a stout and serviceable rope. A $\frac{3}{4}$ -in. rope is not too heavy. One



Swinging on the Merry-Go-Round

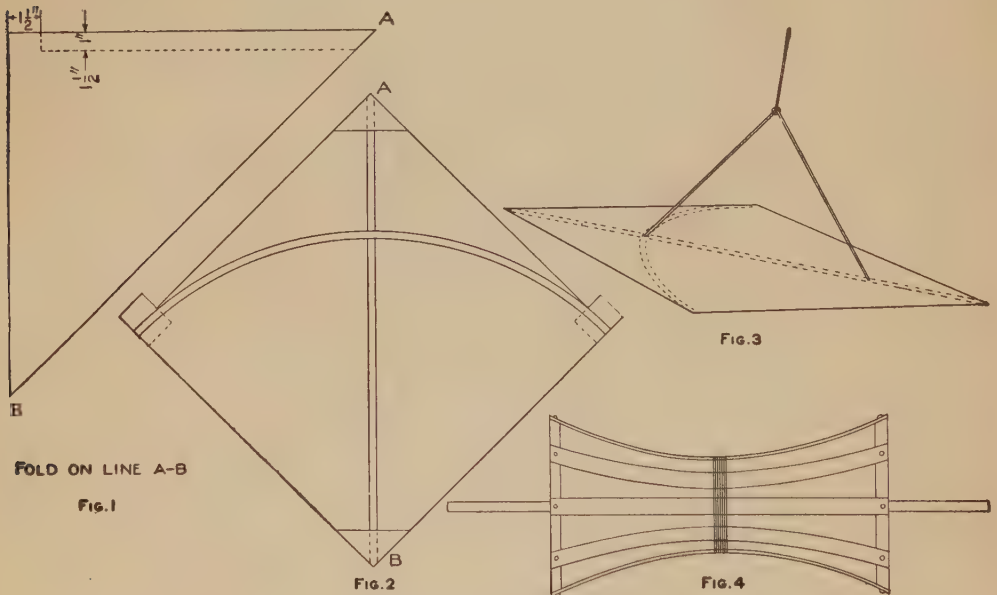
set of ropes are passed through holes at the end of the cross-piece and knotted on top. The other set should be provided with loops at the top and slid over the cross-piece, being held in position by spikes as shown. This makes an easy adjustment. Seat the heavier of the riders on the latter seat, moving it toward the center until a balance with the lighter rider is reached. A rope tied to the cross-piece about 2 ft. from the center, for the "motive power" to grasp, completes the merry-go-round.

Put plenty of soap or grease between the cross-piece and upright. Be sure to have room for the ropes to swing out at high speed, with no trees or buildings in the way. The "wobble" mentioned will give an agreeable undulating motion, which adds greatly to the flying sensation. This will be found surprisingly evident for so small a machine. As there is no bracing, care must be taken to have the two riders sit at the same moment, or the iron bolt will be bent out of line. If it is to be used for adults, strong clear material only should be employed.—Contributed by C. W. Nieman.

How to Make and Fly a Chinese Kite

The Chinese boy is not satisfied with simply holding the end of a kite string and running up and down the block or field trying to raise a heavy paper kite with a half pound of rags for a tail. He makes a kite as light as possible without any tail which has the peculiar property of being able to move in every direction. Sometimes an expert can make one of these kites travel across the wind for several hundred feet; in fact, I have seen boys a full block apart bring their kites together and engage

18 in. long. This he smears along one side with common boiled rice. Boiled rice is one of the best adhesives for use on paper that can be obtained and the Chinese have used it for centuries while we are just waking up to the fact that it makes fine photo paste. Having placed the backbone in position, paste two triangular pieces of paper over the ends of the stick to prevent tearing. The bow is now bent, and the lugs extending from the sides of the square paper are bent over the ends of the bow



Parts of a Chinese Kite

in a combat until one of their kites floated away with a broken string, or was punctured by the swift dives of the other, and sent to earth, a wreck.

The Chinese boy makes his kite as follows:

From a sheet of thin but tough tissue paper about 20 in. square, which he folds and cuts along the dotted line, as shown in Fig. 1, he gets a perfectly square kite having all the properties of a good flyer, light and strong. He shapes two pieces of bamboo, one for the backbone and one for the bow. The backbone is flat, $\frac{1}{4}$ by $\frac{3}{32}$ in. and

and pasted down. If the rice is quite dry or mealy it can be smeared on and will dry almost immediately, therefore no strings are needed to hold the bow bent while the paste dries.

After the sticks are in position the kite will appear as shown in Fig. 2. The dotted lines show the lugs bent over the ends of the bow and pasted down. Figure 3 shows how the band is put on and how the kite is balanced. This is the most important part and cannot be explained very well. This must be done by experimenting and it is enough to say that the kite must

balance perfectly. The string is fastened by a slip-knot to the band and moved back and forth until the kite flies properly, then it is securely fastened.

A reel is next made. Two ends—the bottoms of two small peach baskets will do—are fastened to a dowel stick or broom handle, if nothing better is at hand. These ends are placed about 14 in. apart and strips nailed between them as shown in Fig. 4, and the centers drawn in and bound with a string. The kite string used is generally a heavy packing thread. This is run through a thin flour or rice paste until it is thoroughly coated, then it is run through a quantity of crushed glass. The glass should be beaten up fine and run through a fine sieve to make it about the same as No. 2 emery. The particles should be extremely sharp and full of splinters. These particles adhere to the pasted string and when dry are so sharp that it cannot be handled without scratching the fingers, therefore the kite is flown entirely from the reel. To wind the string upon the reel, all that is necessary is to lay one end of the reel stick in the bend of the left arm and twirl the other end between the fingers of the right hand.

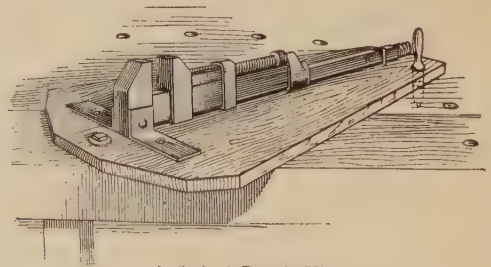
A Chinese boy will be flying a gaily colored little kite from the roof of a house (if it be in one of the large cities where they have flat-roofed houses) and a second boy will appear on the roof of another house perhaps 200 ft. away. Both have large reels full of string, often several hundred yards of it. The first hundred feet or so is glass-covered string, the balance common packing thread, or glass-covered string. As soon as the second boy has his kite aloft, he begins maneuvering to drive it across the wind and over to the first kite. First, he pays out a large amount of string, then as the kite wabbles to one side with its nose pointing toward the first kite, he tightens his line and commences a steady quick pull. If properly done his kite crosses over to the other and above it. The string is now paid out until

the second kite is hanging over the first one's line. The wind now tends to take the second kite back to its parallel and in so doing makes a turn about the first kite's string. If the second kite is close enough, the first tries to spear him by swift dives. The second boy in the meantime is see-sawing his string and presently the first kite's string is cut and it drifts away.

It is not considered sport to haul the other fellow's kite down as might be done and therefore a very interesting battle is often witnessed when the experts clash their kites.—Contributed by S. C. Bunker, Brooklyn, N. Y.

Home-Made Vise

An ordinary monkey wrench that has been discarded is used in making this vise. The wrench is supported by two L-shaped pieces of iron fastened with



A Swivel Bench Vise

a rivet through the end jaw, and these in turn are bolted or screwed to the bench. The handle end is held down with a staple. The inside jaw is used in clamping and is operated with the thumb screw of the wrench. Two holes bored through the thumb piece will greatly facilitate setting up the jaws tightly by using a small rod in the holes as a lever.

The vise may be made into a swing vise if the wrench is mounted on a board which is swung on a bolt at one end and held with a pin at the other as shown in the illustration. Various holes bored in the bench on an arc will permit the board to be set at any angle.—Contributed by Harry S. Moody, Newburyport, Mass.

Ladder Repaired with Wire

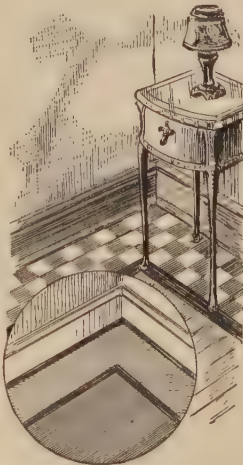


If your ladder is at the stage where it threatens to give way when you are half-way up, it is well worth while to spend an hour repairing it. To do this, get a plow plane and groove a path along the sides of the two standards, making the groove about $\frac{1}{16}$ in. deep. Next get some heavy galva-

nized-iron wire, insert it in the groove, and stretch it tight, using small staples to hold it in place. You can get the wire very tight if you take your time, and after the job is completed, you will find that your ladder is much stronger.

Floors Painted in Two Colors to Improve Appearance

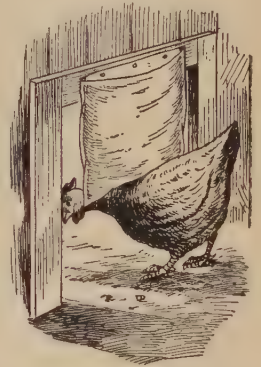
In trying to improve the appearance of a worn softwood floor one usually tries to figure out what paint to use and what color would be most attractive. On this basis the paint is bought and the job done, the result being a more or less indifferent effect in a single color, which grows tiresome in time. The drawing shows methods of floor decoration, which have been followed out with pleasing effect. If nothing elaborate is desired, borders can be painted around



the room that should be in lighter and darker colors contrasting to the rest of the floor. For example, a foot from the wall a strip, about 2 in. wide, is laid off and marked with a chalkline; the main floor space is painted gray, the border darker and the space between it and the baseboard, either a lighter or darker color as desired. Then there is the alternative of painting the space between the narrow border and the baseboard checker-fashion, in order to obtain something of the effect of marquetry flooring.

Disinfecting Poultry

A Wisconsin poultryman uses a novel and simple method for disinfecting the birds of his flock, as shown in the illustration. A cloth bag of coarse weave, somewhat similar to window-curtain material, is partly filled with disinfecting powder and this is tacked above the small door of the poultry house so that fowls entering or leaving the house must brush it with their backs.



Each movement of the sack sifts a small quantity of the powder into their feathers, and, as the process is repeated many times each day, the thorough disinfection of each fowl is insured.

Don't Grease the Springs

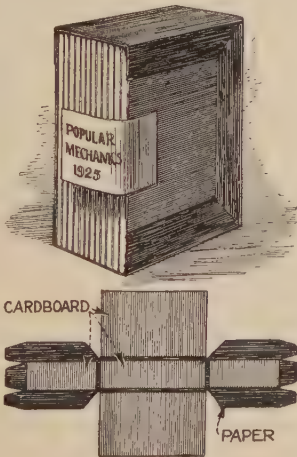
One of the things the automobile driver is prone to do in the attempt to make his car ride as easily as possible is to jack up the car, pry the spring leaves apart, and apply a liberal coating of grease or lubricating oil between the leaves. Some cars may be designed to use lubricant between the leaves; however, in the majority, this practice is not only unnecessary, but, in addition, is apt to ruin the riding qualities of the car for a considerable time. Most cars are designed and sprung so there must be friction between the leaves; not enough friction so that the car will ride hard or

squeak, but enough to give a cushioning effect and an easy spring action, instead of the oscillating action that a coil spring will give, for example. When the springs are lubricated the friction is destroyed, and the car bounces, and keeps on bouncing, when it passes over the slightest bump.

The only thing that is necessary to do with most springs is to keep them free from rust, and this may be accomplished by brushing a little penetrating oil, not lubricating oil, along the sides of the leaves occasionally. Spring covers are an excellent precaution against the entrance of moisture between the leaves, and they should be used wherever possible. Where the owner does not want to apply spring covers, on the score of expense, an excellent substitute can be made by wrapping the springs with a layer of black friction tape. This makes a close-fitting cover, and one that will wear for a long time. The last turns can be bound with a turn or two of wire, and the tape given a coat of enamel, to improve both the appearance and the moisture resistance. If in doubt whether the springs should be lubricated or not, write the manufacturer, but don't apply lubricant, until you know for sure that it will be of benefit.

Cardboard Carton Files Magazines

Magazines can be kept together in neat cardboard cartons made to fit over them snugly. Get some heavy paper of the tough, brown fiber kind and cut it out as shown in the lower detail, reinforcing it by gluing on pieces of cardboard. The overlapping edges of the paper are then glued down over the sides, to form a carton. To keep a number of issues in the carton, remove the advertising and file the magazines in loose-leaf form.



Simple Repair for Torn Tent

During a heavy rainstorm a party of campers had the misfortune to have the wall



Repairing a Torn Tent with Nails and Lacing from the Inside during a Rainstorm

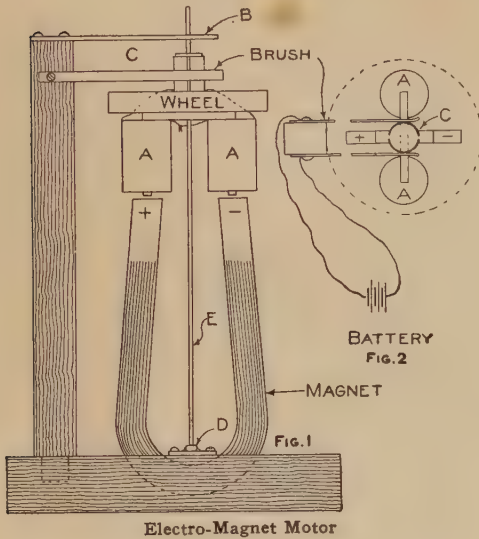
of their tent torn and were at a loss to repair it as no needle was available. However, the rent was satisfactorily closed by means of nails, as shown in the drawing. The nails were stuck through the canvas from the inside across the rent, leaving the heads and points projecting so that a length of twine could be laced over them. In this way the edges of the canvas were drawn together. Had the nails been lacking, green twigs with sharpened ends might have been used quite as effectively.

Test for Detecting Sewer Gas

If you suspect sewer gas but cannot readily determine whether it is that or some other odor, here is a good test: Soak a piece of white unglazed paper in a mixture of 1 oz. of lead acetate and a $\frac{1}{2}$ pt. of rain or distilled water. When the paper is thoroughly dry place it in the suspicious locality and if sewer gas is present the paper will shortly turn dark.—L. B. Robbins, Harwich, Mass.

A Small Electric Motor

The drawing herewith shows a simple electric motor which can be easily constructed by any boy who is at all handy with tools. I made this motor



many times when a boy and can say that if carefully constructed it will run with greater rapidity than the more expensive ones.

A common magnet which can be purchased at any toy store is used. The one shown is $3\frac{1}{2}$ in. in length. The armature core is a strip of $\frac{1}{16}$ by $\frac{1}{4}$ -in. iron, $2\frac{1}{4}$ in. long, bent U-shaped and fastened to the wood flywheel. Each leg of the armature is wound with 10 ft. of No. 24 gauge magnet wire. The commutator is made from an old 22 cartridge filed into two equal parts, each being a half circle, both of which are made fast to a collar on the shaft E. Each half of the commutator must be insulated from the other half. The collar can be made by wrapping paper around the shaft until the required size is obtained.

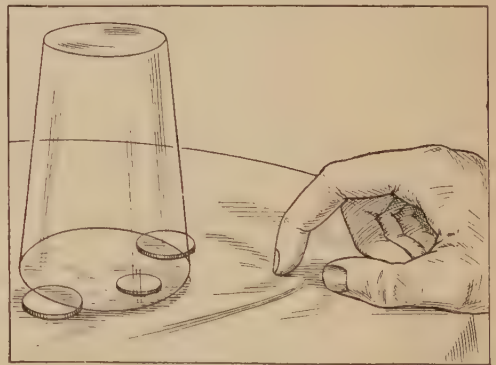
The top end of the shaft runs in a hole bored in a brass support, B, which is screwed on the end of a piece of wood mortised in the base, as shown in Fig. 1. The lower end of the shaft runs in a glass bead, D, which is fast-

ened to a small piece of brass with sealing wax. The small brass piece is fastened to the base with screws. The bead should not have an eye larger in diameter than the shaft. The shaft is made from an old discarded knitting needle. The brushes are fastened to each side of the upright piece of wood supporting the brass bearing B.

The connections to the battery are shown in Fig. 2. Each half of the commutator C is connected to the coils AA as shown in Fig. 1.—Contributed by J. M. Shannon, Pasadena, Calif.

Moving a Coin Under a Glass

Place a penny or a dime on a tablecloth, towel or napkin and cover it over with a glass in such a way that the glass will rest upon two 25 or 50-cent pieces as shown in the sketch. The coin is made to come forth without touching it or sliding a stick under the edge of the glass. It is only necessary to claw the cloth near the glass with the nail of the forefinger.



Removing the Coin

The cloth will produce a movement that will slide the coin to the edge and from under the glass.

¶When playing loud and harsh records on a phonograph the music is often spoiled by the vibration of the metal horn. This may be remedied by buckling a valise or shawl strap around the horn, near the center.

How to Make Paper Balloons

Balloons made spherical, or designed after the regular aeronaut's hot-air balloon, are the best kind to make. Those having an odd or unusual shape will not make good ascensions, and in most

gether right, the pointed ends will close up the top entirely and the wider bottom ends will leave an opening about 20 in. in diameter. A light wood hoop having the same diameter as the



FIG. 1

Paper Balloon

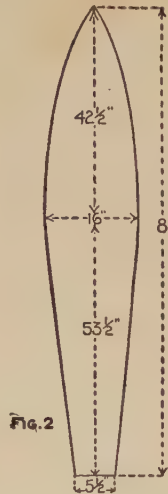


FIG. 2

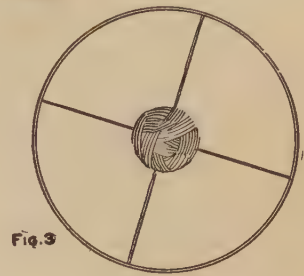


FIG. 3

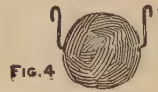


FIG. 4



FIG. 5

Pattern and Parts to Make Balloon

cases the paper will catch fire from the torch and burn before they have flown very far. The following description is for making a tissue-paper balloon about 6 ft. high.

The paper may be selected in several colors, and the gores cut from these, pasted in alternately, will produce a pretty array of colors when the balloon is in flight. The shape of a good balloon is shown in Fig. 1. The gores for a 6-ft. balloon should be about 8 ft. long or about one-third longer than the height of the balloon. The widest part of each gore is 16 in. The widest place should be 53½ in. from the bottom end, or a little over half way from the bottom to the top. The bottom of the gore is one-third the width of the widest point. The dimensions and shape of each gore are shown in Fig. 2.

The balloon is made up of 13 gores pasted together, using about ½-in. lap on the edges. Any good paste will do—one that is made up of flour and water well cooked will serve the purpose. If the gores have been put to-

gether right, the pointed ends will close up the top entirely and the wider bottom ends will leave an opening about 20 in. in diameter. A light wood hoop having the same diameter as the

opening is pasted to the bottom end of the gores. Two cross wires are fastened to the hoop, as shown in Fig. 3. These are to hold the wick ball, Fig. 4, so it will hang as shown in Fig. 5. The wick ball is made by winding wicking around a wire, having the ends bent into hooks as shown.

The balloon is filled with hot air in a manner similar to that used with the ordinary cloth balloon. A small trench or fireplace is made of brick having a chimney over which the mouth of the paper balloon is placed. Use fuel that will make heat with very little smoke. Hold the balloon so it will not catch fire from the flames coming out of the chimney. Have some alcohol ready to pour on the wick ball, saturating it thoroughly. When the balloon is well filled carry it away from the fireplace, attach the wick ball to the cross wires and light it.

In starting the balloon on its flight, take care that it leaves the ground as nearly upright as possible.—Contributed by R. E. Staunton.

A Simple Steamboat Model

The small boat shown in the accompanying sketch may have a length of 12 to 18 in. and is constructed in the

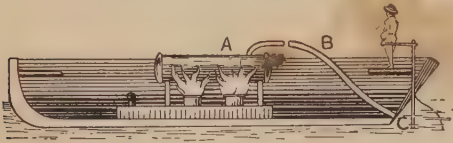


Fig 1

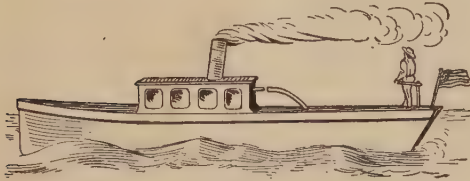


Fig 2

Sectional View and Completed Boat

following manner: A small steam boiler, A, is supported by two braces over an alcohol lamp in the middle of the boat. A small pipe is fastened to the top of the boiler in such a way that the open end will be opposite the open

end of another pipe, B, somewhat larger in size. The pipe B opens into the stern of the boat at C, as shown in Fig. 1. The steam, coming through the small pipe A, is driven forcibly through the larger pipe B, and carries with it a certain amount of air out through the opening C into the water. As the boat is driven forward by this force, the steam arises to the surface in the form of bubbles. The boat soon attains considerable speed, leaving a long wake behind.

To Remove Grease from Machinery

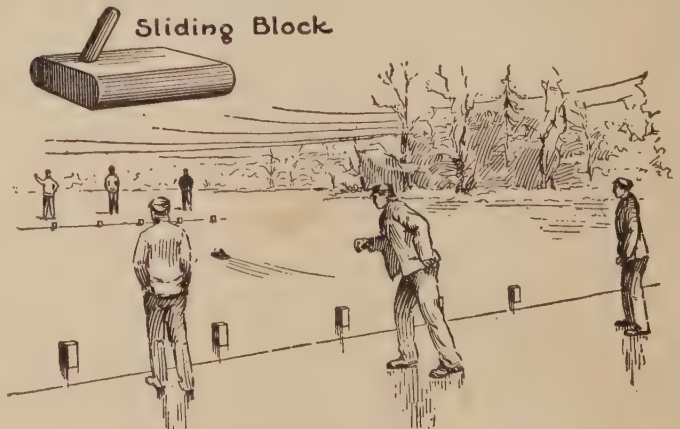
A good way to remove grease or oil from machinery before painting is to brush slaked lime and water over the surface, leaving the solution on over night. After washing, the iron is dried and the paint will stick to it readily.

In removing grease from wood, common whitewash may be left on for a few hours and then washed off with warm water, after which the paint will adhere permanently.

A Game Played on the Ice

Two lines are drawn parallel on the ice from 50 to 100 ft. apart and blocks of wood are placed every 6 ft. apart on these lines. The player opening the game skates to the line and delivers, in bowling form, a sliding block similar to the blocks that are placed on the lines with the exception that it has a handle. The blocks are about 6 in. wide by 6 in. high and 8 in. long. The sliding blocks should be at least 1 ft. long and each provided with a handle. The handle is attached by boring a hole near one end in the middle of the block and driving in a wood pin. The hole is bored slanting so as to incline the handle. Two of these blocks

are provided for the reason that when a player bowls one of the opposing player's blocks over the line he is entitled to another throw. The side wins that bowls over all of the opposing



Bowling Over the Opponent's Blocks

players' blocks first. This will prove an interesting and enjoyable pastime for skaters.

Making Photo Silhouette Brass Plaques

Secure a brass plate having a smooth surface the right size for the photograph and cover it with a coat of paraffin. This is done by heating the paraffin in a vessel hot enough to make the wax run freely, then pouring the liquid over the entire surface of the brass.

When the paraffin has cooled sufficiently the outlines of the photograph must be drawn upon its surface. There are three ways of doing this: First, the photograph can be traced on tissue paper and then retraced on the paraffin surface. The exact outlines of the photograph can be obtained this way without destroying the print. Second, if you have several copies of the photograph, one can be utilized by tracing direct to the surface of the paraffin. In using either of the two methods described, carbon paper must be placed on the paraffin before the tissue paper or photograph is laid upon it. Third, cut out the outlines of the photograph and lay it on the paraffin surface, then trace around the edges with the point of a needle or sharp point of a knife. The outlines drawn by the first method are cut through the paraffin in the same way. The paraffin is carefully removed from the

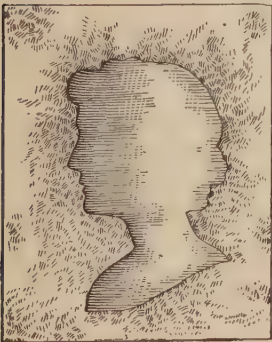


Fig. 1
Waxed Brass Plate

is made up of $1\frac{1}{2}$ parts muriatic acid and 2 parts water. The mixture should be placed in a glass or earthenware

vessel. If the plate is a small one a saucer will do for the acid solution. Pour the acid on the plate where the paraffin has been removed and allow it time to etch. The acid should be removed every five minutes to examine the etching. If any places show up where the paraffin has not been entirely re-



Fig. 2
Finished Plaque

removed they must be cleaned so the acid will eat out the metal. When the acid solution becomes weak new solution must be added until the proper depth is secured. Rinse the plate in cold water, stand in a tray and heat it sufficiently to run off all the paraffin. Polish the plate by rubbing it with a piece of flannel.

The plaque can be given a real antique finish by painting the etched part with a dull black paint. Drill a small hole in each of the four corners, being careful not to dent the metal. The plaque is backed with a piece of wood $\frac{3}{4}$ in. thick, the dimensions of which should exceed those of the brass plate sufficiently to harmonize with the size of the plaque. The wood should be painted black with the same paint used in the plaque. Paint the heads of four thumb tacks black and use them in fastening the plaque to the board. The finished silhouette will appear as shown in Fig. 2.—Contributed by John A. Hellwig, Albany, N. Y.

☞ Automobile headlights should be set to throw the light straight ahead, not pointed down at the road at an angle.

The Busy-Blacksmiths Toy Amuses Everyone

As the moving parts of the busy-blacksmiths toy are ordinary clothespins pivoted on short wooden slats, it is extremely easy to make it, and it will prove very popular. The clothespins

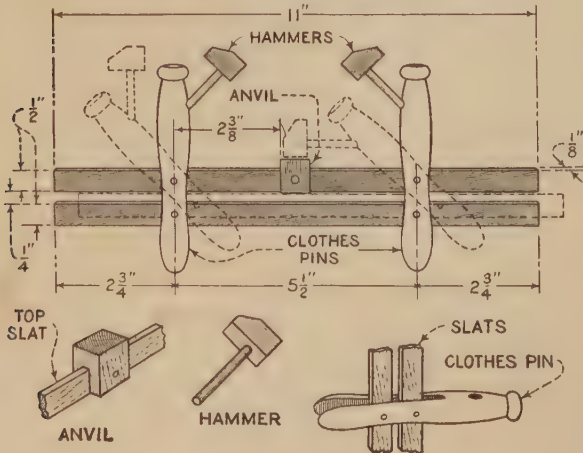
constructional details. The slats are spaced about $\frac{1}{4}$ in. apart when their ends are in line. Holes are drilled in the clothespins at an angle to receive the hammers,



Busy-Blacksmiths Toy, Made from Thin Wooden Slats and Ordinary Clothespins, Is Easy to Construct, and Will Prove a Popular Number with Children

are sandpapered smooth and are then carved and painted, or merely painted, to resemble men. Two $\frac{1}{8}$ -in. slats, $\frac{1}{2}$ in. wide and 11 in. long, are also sandpapered smooth so that they will fit loosely between the slot in the clothespins, where they are attached with headless wire nails at points $5\frac{1}{2}$ in. apart, as indicated in the drawing that shows the dimensions and

which consist of small blocks whittled to shape with a jackknife, and short lengths of $\frac{1}{8}$ -in. dowel stock, or similar round pieces, carved from any piece of wood. Glue is used to hold the handles of the hammers in the clothespins and in the hammer heads. The anvil is attached to the upper slat, as indicated, it being cut to straddle the slat and then nailed on.



Its size should be such that the two hammers will strike it alternately at the time the slats come together as they are pulled or pushed lengthwise in opposite directions by two playmates. The hammer shanks must also be of such a length that the heads will strike the anvil squarely when the slats are pulled. Usually this toy is operated by grasping the end of the slats, but another method of using it is to set it on the table with two people to operate it. It is also possible to run this toy with a small engine. In that case, the bottom slat should be fastened rigidly to

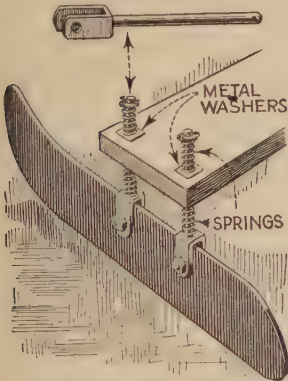
a wooden base and the upper slat joined with a connecting rod to the flywheel of the motor. A toy of this type is strong and will afford endless amusement for the children.

How to Detect Rosin Varnish

It does not take long to learn that varnish containing rosin is a very inferior grade. The best test to detect a rosin varnish is to rub the ball of the finger over it. If the varnish used is of good quality, the shine of the polish will be increased, but if it is rosin varnish, the rubbed spot will appear dull. This proves that rosin varnish is not hard enough to withstand wear of any kind. One should always be sure, when buying varnish, to get the best. Naturally the cheapness of rosin varnish has brought it into use in many homes, which have been built for price and not for service. It will pay anyone to avoid anything in varnishes which has a rosin base, for it will be ruined by water.—L. H. Georger, Buffalo, N. Y.

Shock-Absorbing Iceboat Runners

The usual method of fastening iceboat runners is to use a single bolt through the runner and the chock, which gives no resiliency whatever, and results in making the iceboat travel uncomfortably. The method shown in the illustration involves the use of two iron chocks for each runner.



Long bolts are welded to the chocks to stand vertically. The bolts are slipped through holes drilled in the ends of the runner plank, and steel coil springs are provided above and below the plank to serve as shock absorbers. A washer and cotter pin at the upper end of each bolt, above the top spring, keep the runners in position securely.

Fountain Provides Water for Dogs

A plumber of Huron, S. Dak, arranged a water fountain in the street to provide water for dogs. A square depression,



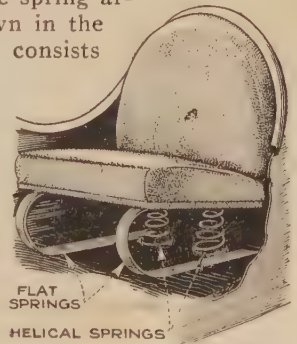
Overflow of Water Fountain Provides for Thirsty Dogs in Sidewalk Depression

about 4 in. deep, was made in the concrete next to the curb. During the summer months the overflow from the fountain was directed into it, the recess itself having an overflow into the gutter. People continually using the fountain kept the depression full of fresh water.—Frank W. Bentley, Jr., Missouri Valley, Iowa.

Spring Construction for Seat of Racing Auto

Additional riding comfort on bucket seats for racing-type autos can be gained by providing the spring arrangement shown in the illustration. It consists

of two U-shaped supports, made from old carriage springs, which are drilled at the ends for bolts, and bent at the centers. To obtain the required stiffness, two or more helical springs are attached to the flat springs as indicated.—G. A. Luers, Washington, D. C.



Frame for Displaying Both Sides of Coins

It is quite important for coin collectors to have some convenient way to

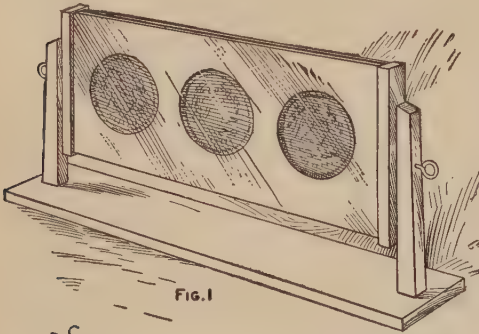


FIG. 1



FIG. 2

Holding Coins between Glasses

show both sides of coins without touching or handling them. If the collection consists of only a few coins, they can be arranged in a frame as shown in Fig. 1. The frame is made of a heavy card, A, Fig. 2, the same thickness as the coins, and covered over on each side with a piece of glass, B. Holes are cut in the card to receive the coins C. The frame is placed on bearings so it may be turned over to examine both sides. If there is a large collection of coins, the frame can be made in the same manner and used as drawers in a cabinet. The drawers can be taken out and turned over.—Contributed by C. Purdy, Ghent, O.

How to Make Lantern Slides

A great many persons who have magic lanterns do not use them very much, for after the slides have been shown a few times, they become uninteresting, and buying new ones or even making them from photographic negatives is expensive. But by the method described in the following paragraph any one can make new and interesting slides in a few minutes' time and at a very small cost.

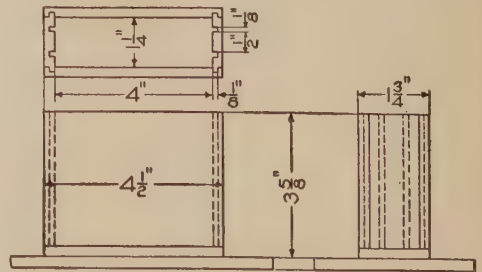
Secure a number of glass plates of

the size that will fit your lantern and clean them on both sides. Dissolve a piece of white rosin in a half-pint of gasoline and flow it over one side of the plates and allow to dry. Place the dried plate over a picture you wish to reproduce and draw the outline upon the thin film. A lead pencil, pen and ink or colored crayons can be used, as the rosin and gasoline give a surface that can be written upon as easily as upon paper. When the slide becomes uninteresting it can be cleaned with a little clear gasoline and used again to make another slide. A slide can be made in this way in five minutes and an interesting outline picture in even less time than that.

This solution also makes an ideal re-touching varnish for negatives.—Contributed by J. E. Noble, Toronto, Canada.

How to Make a Developing Box

A box for developing $3\frac{1}{4}$ by $4\frac{1}{4}$ -in. plates is shown in detail in the accompanying sketch. It is made of strips of wood $\frac{1}{4}$ -in. thick, cut and grooved, and then glued together as indicated. If desired, a heavier piece can be placed on the bottom. Coat the inside of the box with paraffin or wax, melted and applied with a brush. Allow it to fill all crevices so that the developing box will be watertight. It will hold 4 oz. of developer. Boxes for larger plates



Details of the Developing Box

can be made in the same manner. Use a small wooden clip in taking the plates out of the box, being careful not to scratch the sensitive film.—Contributed by R. J. Smith, Milwaukee, Wis.

Staining Wood

A very good method of staining close-grained woods is to use muriatic acid. The acid is put on with a brush like any ordinary stain. The colors thus obtained are artistic and most beautiful, and cannot be duplicated by any known pigment. The more coats applied the darker the color will be. This method of staining has the advantage of requiring no wiping or rubbing. —Contributed by August T. Neyer, One Cloud, Cal.

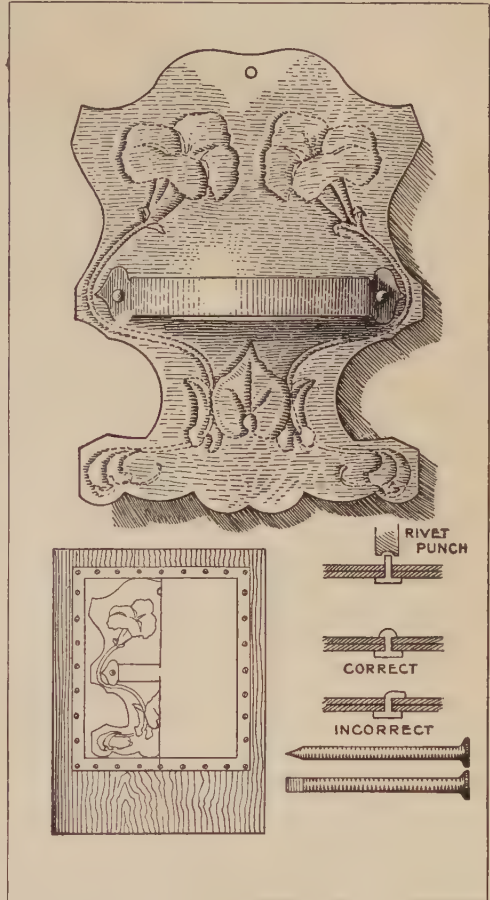
Sheet-Metal Whisk-Broom Holder

A whisk-broom holder such as is shown in the accompanying picture may be easily made by the amateur. The tools needed are few: a pair of tin shears, a metal block of some kind upon which to pound when riveting, a hammer or mallet, several large nails, and a stout board upon which to work up the design. A rivet punch is desirable, though not absolutely necessary.

The material required is a sheet of No. 24 gauge copper or brass of a size equal to that of the proposed holder, plus a $\frac{3}{8}$ -in. border all around, into which to place the screws that are to be used to hold the metal to the board while pounding it. The design shown in the picture is 6 by 8 in. at the widest part and has proven a satisfactory holder for a small broom.

Carefully work out the design desired on a piece of drawing paper, both outline and decoration, avoiding sharp curves in the outline because they are hard to follow with the shears when cutting the metal. If the design is to be of two-part symmetry, like the one shown, draw one part, then fold on a center line and duplicate this by inserting double-surfaced carbon paper and tracing the part already drawn. With this same carbon paper transfer the design to the metal. Fasten the metal to the board firmly, using $\frac{1}{2}$ -in. screws placed about 1 in. apart in holes previously punched in the margin with a nail set or nail.

To flatten the metal preparatory to fastening it to the board, place a block of wood upon it and pound on this block, never upon the metal directly,



Completed Holder
Brass Fastened to Board—Method of Riveting

or the surface will be dented and look bad in the finished piece.

Take the nail, a 10 or 20-penny wire or cut, and file it to a chisel edge, rounding it just enough to take the sharpness off so that it will not cut the metal. This tool is used for indenting the metal so as to bring out the outline of the design on the surface.

There are several ways of working up the design. The simplest way is to take the nail and merely "chase" the outlines of holder design. Remove the screws, cut off the surplus metal.

and file the edges until they are smooth. Make a paper pattern for the metal band that is to hold the broom. Trace around this pattern on the metal and cut out the shape. Punch rivet holes in holder and band, also a hole by which to hang the whole upon the wall.

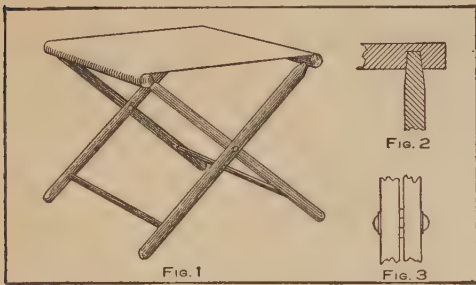
Rivet the band to the holder. Punch the rivet holes with a nail set and make the holes considerably larger than the diameter of the rivet, for in flattening the raised edges the holes will close. Do the riveting on a metal block and keep the head of the rivet on the back

of the holder. Round up the "upset" end of the riveted part as shown in the picture. Do not bend it over or flatten it. This rounding is done by pounding around the outer edge of the rivet end and not flat upon the top as in driving a nail.

Clean the metal by scrubbing it off with a solution composed of one-half water and one-half nitric acid. Use a rag tied to a stick and do not allow the acid to touch either your hands or clothes. A metal lacquer may next be applied to keep the metal from early corrosion.

How to Make a Camp Stool

The stool, as shown in Fig. 1, is made of beech or any suitable wood



Camp Stool Details

with a canvas or carpet top. Provide four lengths for the legs, each 1 in. square and 18½ in. long; two lengths, 1½ in. square and 11 in. long, for the top, and two lengths, ¾ in. square, one 8½ and the other 10½ in. long, for the lower rails.

The legs are shaped at the ends to fit into a ⅝-in. hole bored in the top pieces as shown in Fig. 2, the distance between the centers of the holes being 7⅝ in. in one piece and 9⅝ in. in the other. The lower rails are fitted in the same way, using a ½-in. hole bored into each leg 2½ in. up from the lower end.

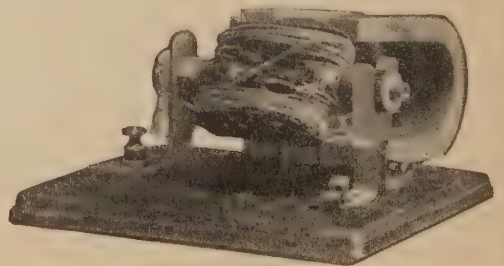
Each pair of legs has a joint for folding and this joint is made by boring a hole in the middle of each leg, inserting a bolt and riveting it over washers with a washer placed between the legs as shown in Fig. 3. The

entire length of each part is rounded off for the sake of neatness as well as lightness.

About ½ yd. of 11-in. wide material will be required for the seat and each end of this is nailed securely on the under side of the top pieces. The woodwork may be stained and varnished or plain varnished and the cloth may be made to have a pleasing effect by stencilling in some neat pattern.

A Small Home-Made Electric Motor

The accompanying photographs show the construction of a very unique electric motor, the parts consisting of the frame from an old bicycle pedal wrapped with insulated wire to make the armature and three permanent magnets taken from an old telephone magneto. The pedal, being ball bearing, rotated with very little friction and at a surprisingly high rate of speed.



The Motor Complete

The dust cap on the end of the pedal was removed and a battery connection, having quite a length of threads, was

soldered to it as shown in the photograph. The flanges were removed from an ordinary spool and two strips of brass fastened on its circumference for the commutator. The spool was held in position by a small binding



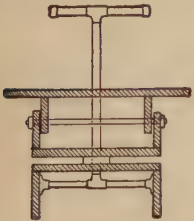
Commutator Parts

post nut. The shape of this nut made a good pulley for a cord belt.—Contributed by John Shahan, Attalla, Ala.

Rocker Blocks on Coaster Sleds

The accompanying sketch shows a coasting sled with rocker blocks attached on both front and rear runners. The runners and the other parts of the sled are made in the usual way, but instead of fastening the rear runners solid to the top board and the front runners to turn on a solid plane fifth wheel, they are pivoted so each pair of runners will rock when going over bumps.

The illustration will explain this construction without going into detail and giving dimensions for a certain size, as these rocker blocks can be attached to any coaster or toboggan sled. It will be noticed that the top board may bend as much as it will under the load without causing the front ends of the rear runners and the



Coaster Sled with Rocker Runners

rear ends of the front runners gouging into the snow or ice.—Contributed by W. F. Quackenbush, New York City.

How to Make a Watch Fob

This novelty watch fob is made from felt, using class, college or lodge colors combined in the making with emblems or initials colored on the texture. Two pieces of felt, each $1\frac{1}{4}$ in. wide and $4\frac{1}{4}$ in. long, are cut V-shaped on one end of each piece about 1 in. in depth, and $\frac{3}{8}$ in. in from the other end of one piece cut a slit $\frac{1}{2}$ in. long; the end of the other piece is folded over, making a lap of about 1 in., and a slit is cut through the double thickness to match the one cut in the first piece. The desired emblem, initial, or pennant is stenciled on the outside of the folded piece with class, college or lodge colors. The strap is made from a strip of felt 3-16 in. wide and $8\frac{1}{4}$ in. long; stitched on both edges for appearance. Make a hole with a punch $1\frac{1}{4}$ in. from one end, and two holes in the other, one about 1 in. and the other $2\frac{3}{4}$ in. from the end. Purchase a $\frac{1}{2}$ -in. buckle from a harness maker and you will have all the parts necessary for the fob. Assemble as shown in the sketch. The end of the strap having the two holes is put through the slots cut in the wide pieces and the tongue of the buckle is run through both holes. The other end is passed through the ring of the watch and fastened in the buckle as in an ordinary belt.—Contributed by C. D. Luther, Ironwood, Mich.



A good lubricant for drilling is made by dissolving $\frac{3}{4}$ to 1 lb. of sal-soda in one pailful of water.

New Way to Remove a Bottle Stopper

Take a bottle of liquid, something that is carbonated, and with the aid of a napkin form a pad which is applied

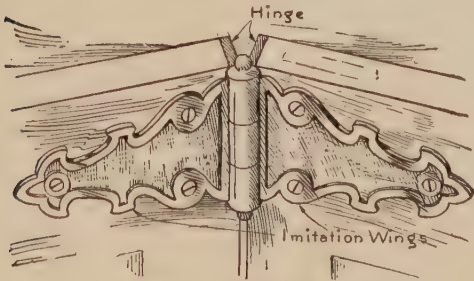


Removing the Stopper

to the lower end of the bottle. Strike hard with repeated blows against the solid surface of a wall, as shown in the sketch, and the cork will be driven out, sometimes with so much force that a part of the liquid comes with it and deluges the spectators, if desired by the operator.

Imitation Fancy Wings on Hinges

The accompanying sketch shows how I overcame the hardware troubles when I was not able to find ready-made hinges in antique design for a mission sideboard and buffet. This method allows a wide range of designs, which



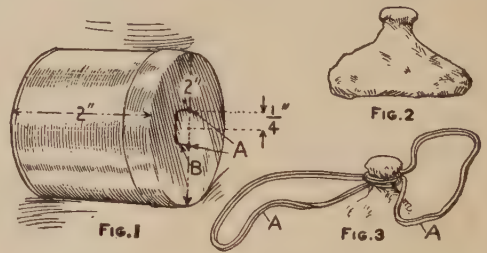
Fancy Hinge Wings

can be made at home with ordinary tools. The wings are made of copper or brass and finished in repoussé, or can

be tarnished and the high places burnished with 000 sandpaper or steel wool, then lacquered with white shellac or banana bronzing liquid.—Contributed by John H. Schatz, Indianapolis, Ind.

How to Make a Child's Rolling Toy

Secure a tin can, or a pasteboard box, about 2 in. in diameter and 2 in. or more in height. Punch two holes A, Fig. 1, in the cover and the bottom, $\frac{1}{4}$ in. from the center and opposite each other. Then cut a curved line from one hole to the other, as shown at B. A piece of lead, which can be procured from a plumber, is cut in the shape shown in Fig. 2, the size being 1 by $1\frac{1}{8}$ by $1\frac{1}{4}$ in. An ordinary rubber band is secured around the neck of the piece of



Rolling Can Toy

lead, as shown in Fig. 3, allowing the two ends to be free. The pieces of tin between the holes A, Fig. 1, on both top and bottom, are turned up as in Fig. 4, and the ends of the bands looped over them. The flaps are then turned down on the band and the can parts put together as in Fig. 5. The can may be decorated with brilliant colored stripes, made of paper strips pasted on the tin. When the can is rolled away from you, it winds up the rubber band, thus storing the propelling power which makes it return.—Contributed by Mack Wilson, Columbus, O.

How to Make a Portfolio

Secure a piece of Russian modeling calf leather of a size equal to 12 by 16 in. Make a paper pattern of the size indicated in the accompanying drawing, putting in the design.

The necessary tools consist of a stick with a straight edge and a tool with an end shaped like that of a nutpick. A nutpick with a V-shaped point will do if the sharpness is smoothed off by means of a piece of emery paper, so that it will indent without cutting the leather. These tools can be bought for this special purpose, but are not essential for this piece if the nutpick is at hand. There will also be needed a level, non-absorbent surface upon which to lay the leather while working it. A piece of thick glass, metal, or marble will serve.

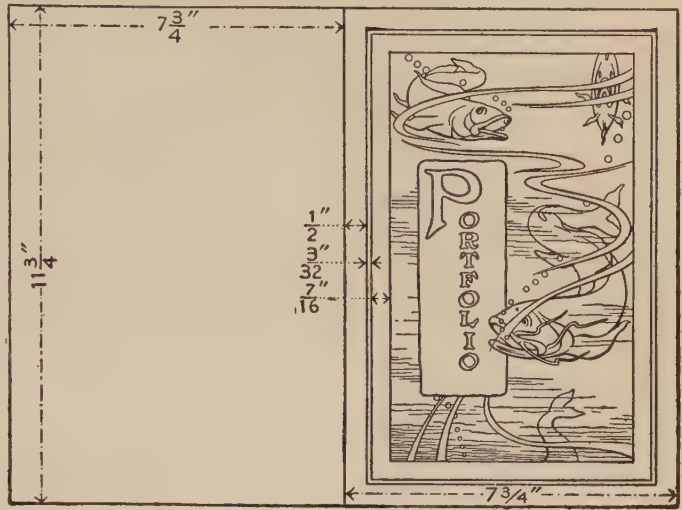
Begin work by moistening the leather on the back side with a sponge or cloth. Moisten as much as you dare and still not have the moisture show on the face side. Next place the leather on the glass, face up, and, holding the pattern firmly in place so that it will not slip—if possible get some one to hold the pattern for you—place the straight edge on the straight lines and mark out or indent. After this has been done, mark over the design. A pencil may be used the first time over.

The pattern is now to be removed and all the lines gone over with the tool to make them deep and uniform.

The surplus stock around the edges may not be cut off. A neat way to finish the edges is to punch a series of holes entirely around through which a thin leather thong may be laced. If it is desired to "line" the inside, this should be done before the holes are punched or the lacing done.

Gear for Model Work

When a gear is needed to drive a small pinion and there is none of the right size at hand, one can be made in the following manner: Turn up a wood



Portfolio Design

disk to the proper diameter and $\frac{1}{4}$ in. thicker than the pinion, and cut a flat bottom groove $\frac{1}{8}$ in. deep in its face. The edges should be about $\frac{1}{8}$ in. or more thick on each side. Measure the distance between centers of two adjacent teeth in the pinion and step this off around the periphery in the bottom of the groove. Drill holes into the wood on each point stepped off and insert steel pins made of wire, allowing



Fig. 1

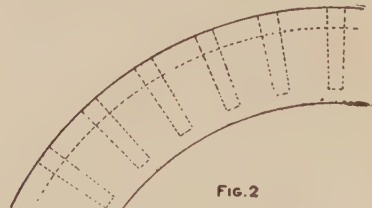


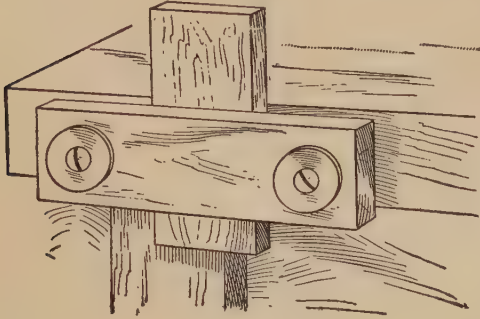
Fig. 2

Steel Pins in Wood

the end of each to protrude just far enough to act as a tooth. In this way a good gear for light work can be quickly and cheaply constructed.—Contributed by Henry Schaefer, New York City.

A Home-Made Vise

While making a box I had some dovetailing to do, and as there was no



Vise on Bench

vise on the bench I rigged up a substitute. I secured a board $\frac{3}{4}$ in. thick, 3 in. wide and 20 in. long and bored a $\frac{1}{2}$ -in. hole through it, 1 in. from each end. The board was then attached to the bench with two screws passing through washers and the two holes in the board into the bench top. The screws should be of a length suitable to take in the piece to be worked.—Contributed by A. M. Rice, Syracuse, New York.

Cardboard Spiral Turned by Heat

A novel attraction for a window display can be made from a piece of stiff cardboard cut in a spiral as shown in Fig. 1. The cardboard should be about 7 or 8 in. in diameter. Tie a piece of string to the center point of the spiral



Fig. 1

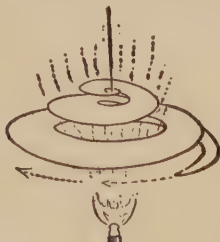


Fig. 2

Spiral Cut from Cardboard

and fasten it so as to hang over a gas jet, Fig. 2. A small swivel must be put in the string at the top or near the cardboard, if it is desired to have the

spiral run for any length of time. The cardboard will spin around rapidly and present quite an attraction.—Contributed by Harry Szerlip, Brooklyn, N. Y.

A Workbench for the Amateur

The accompanying detail drawing shows a design of a portable workbench suitable for the amateur woodworker. This bench can be made easily by anyone who has a few sharp tools and a little spare time. If the stock is purchased from the mill ready planed and cut to length, much of the hard labor will be saved. Birch or maple wood makes a very good bench. and the following pieces should be ordered:

- 4 legs, 3 by 3 by 36.
- 2 side rails, 3 by 3 by 62½ in.
- 2 end rails, 3 by 3 by 20 in.
- 1 back board, 1 by 9 by 80 in.
- 1 top board, 2 by 12 by 77 in.
- 1 top board, 1 by 12 by 77 in.
- 2 crosspieces, 1½ by 3 by 24 in.
- 1 piece for clamp, 1½ by 6½ by 12 in.
- 1 piece for clamp, 1½ by 6½ by 14 in.
- 4 guides, 2 by 2 by 18 in.
- 1 screw block, 3 by 3 by 6 in.
- 1 piece, 1½ by 4½ by 10½ in.

Make the lower frame first. Cut tenons on the rails and mortise the posts, then fasten them securely together with $\frac{3}{8}$ by 5-in. lag screws as shown. Also fasten the 1½ by 3 by 24-in. pieces to the tops of the posts with screws. The heads should be countersunk or else holes bored in the top boards to fit over them. Fasten the front top board to the crosspieces by lag screws through from the under side. The screws can be put in from the top for the 1-in. thick top board.

Fasten the end pieces on with screws, countersinking the heads of the vise end. Cut the 2-in. square holes in the 1½ by 4½ by 10-in. pieces for the vise slides, and fit it in place for the side vise. Also cut square holes in the one end piece for the end vise slides as shown. Now fit up the two clamps. Fasten the slides to the front pieces with screws. Countersink the heads of the screws so they will not be in the way of the hands when the vise is used. The two clamp screws should be about 1½ in. in diameter. They can be purchased at a hardware store. A block

Repairing a Worn Knife Blade

When the blade of a favorite pocket knife, after constant use, becomes like A, Fig. 1, it is more dangerous than

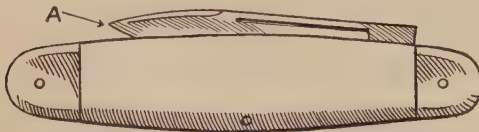


FIG. 1

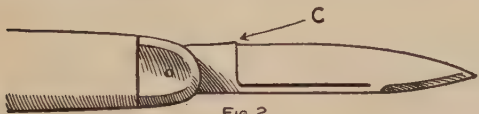


FIG. 2



FIG. 3

The Blade Is Cut Down

useful. To cut down the already worn blade would leave only a stump, but if the blade is fastened in a vise and the point B filed off until it is like C, Fig. 2, the projecting point A, Fig. 1, will sink into the handle as shown at D, Fig. 3, and the knife will be given a new lease of usefulness.—Contributed by James M. Kane, Doylestown, Pa.

How to Make a Leather Spectacle Case

The spectacle case shown in the accompanying illustration may be made of either calf or cow skin. The calf skin, being softer, will be easier to work, but will not make as rigid a case as the cow skin. If calf skin is to be used, secure a piece of modeling calf. The extreme width of the case is $2\frac{3}{8}$ in. and the length $6\frac{5}{8}$ in. Two pieces will be required of this size. Put on the design before the two parts are sewed together. First draw the design on paper, then prepare the leather. Place the leather on a small non-absorbent surface, such as copper or

brass, and moisten the back side with as much water as it will take and still not show on the face side. Turn the leather, lay the design on the face, and hold it in place while both the outline and decoration are traced on the surface with a pencil or some tool that will make a sharp line without tearing the paper.

After the outlines are traced, go over the indentations a second time so as to make them sharp and distinct. There are special modeling tools that can be purchased for this purpose, but a V-shaped nut pick, if smoothed with emery paper so that it will not cut the leather, will do just as well.

Take a stippling tool—if no such tool is at hand, a cup-pointed nail set will do—and stamp the background. It is intended that the full design shall be placed on the back and the same design placed on the front as far as the material will allow. Be careful in stamping not to pound so hard as to cut the leather. A little rubbing on the point with emery will take off the sharpness always found on a new tool.

Having prepared the two sides, they may be placed together and sewed around the edges.

If cow hide is preferred, the same



Two Designs of Cases

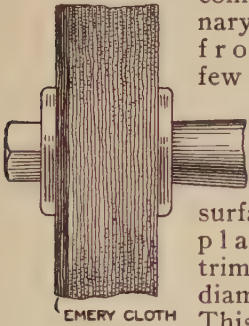
method of treatment is used, but a form will need to be made and placed inside the case while the leather is drying to give it the right shape. The form can be made of a stick of wood.

Waterproofing a Wall

The best way to make a tinted wall waterproof is to first use a material composed of cement properly tinted and with no glue in it—one that will not require a glue size on the wall. After this coating of cement is applied directly to the plaster, cover it completely with water enamel and, when dry, give the surface a thorough coating of varnish. This will make a perfectly impervious covering, which steam, water or heat will not affect.—Contributed by Julia A. White, New York City.

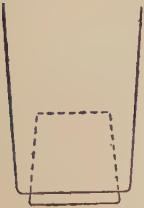
Polishing Flat Surfaces

The work of finishing a number of brass castings with flat sides was accomplished on an ordinary polishing wheel, from which the first few layers of cloth were removed and replaced with emery cloth. The emery surface of the cloth was placed outward and trimmed to the same diameter as the wheel. This made a sanding and polishing wheel in one.—Contributed by Chester L. Cobb, Portland, Maine.



Rubber Tip for Chair Legs

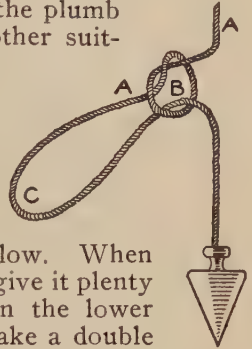
An inexpensive method of preventing a chair from scratching the floor is to bore a hole of the proper size in the bottom end of each chair leg and then procure four rubber stoppers of uniform size and press them into place.



This cushion of rubber eliminates vibrations, and they will not slip nor mar the finest surface upon which they rest.—Contributed by W. A. Jaquythe, Richmond, Cal.

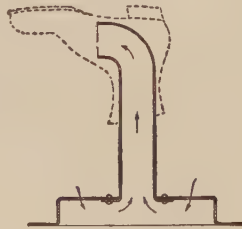
Adjusting a Plumb-Bob Line

When plumbing a piece of work, if there is no help at hand to hold the overhead line, it is common practice to fasten the plumb line to a nail or other suitable projection. On coming down to the lower floor it is often found that the bob has been secured either too high or too low. When fastening the line give it plenty of slack and when the lower floor is reached make a double loop in the line, as shown in the sketch. Tightening up on the parts A A will bind the loop tight B, and an adjustable friction-held loop, C, will be had for adjusting the bob accurately either up or down.—Contributed by Chas. Herrman, New York City.



Drier for Footwear

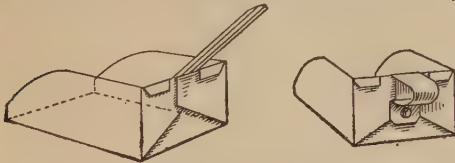
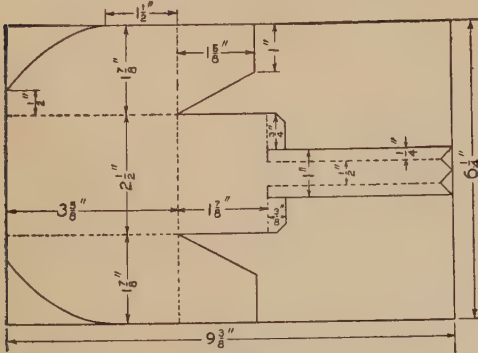
A drier for footwear can be readily made by a tinner, or anyone that can shape tin and solder. The drier consists of a pipe of sufficient length to enter the longest boot leg. Its top is bent at right angles and the other end is riveted to a base, an inverted stew-pan, for instance, in whose bottom a few perforations have been made to let air in. The boot or stocking to be dried is placed over the pipe and the whole set on a heated surface. The heat will cause a rapid circulation of air which will dry the article quickly.—Contributed by Wm. Roberts, Cambridge, Mass.



CA very satisfactory repair can be made by using a good photographic paste to fasten a torn window shade to its roller.

A Shot Scoop

In the ammunition department of our hardware store the shot was kept in regular square bins and dished out



A Small Square Scoop Made of Tin for Dipping Up Shot Stored in a Square Bin

with a round-bottom scoop. This was very difficult, especially when the bottom of the bin was nearly reached, as the round scoop would roll over them and only pick up a few at a time. To overcome this difficulty I constructed a square-shaped scoop that gave entire satisfaction. The scoop can be used for other purposes as well.

A thick piece of tin, $6\frac{1}{4}$ by $9\frac{3}{4}$ in., was marked out as shown, the pattern being cut on the full lines and bent on the dotted ones. The strip for the handle was riveted to the end of the scoop.—Contributed by Geo. B. Wright, Middletown, Conn.

Removing Grease Stains from the Leaves of a Book

Happening to get a grease spot on a page of a valuable book, I found a way to remove it without injury to the paper, which has been tried out several times with success.

Heat an iron and hold it as near as possible to the stain without discoloring the paper, and the grease will dis-

appear. If any traces of the grease are left, apply powdered calcined magnesia. Bone, well calcined and powdered, and plaster of Paris are also excellent absorbents of grease.

A beautifully bound book, and quite new, had oil from a lamp spilled over it. There was no quicklime to be had, so some bones were quickly calcined, pulverized and applied. The next morning there was no trace of oil, but only an odor which soon vanished.—Contributed by Paul Keller, Indianapolis, Ind.

Tightening Cane in Furniture

Split cane, used as part of furniture, such as chair seats, often becomes loose and the threads of cane pull out. This can be prevented by sponging with hot water, or by applying steaming cloths to the cane. This process also tightens the shreds of cane and does not injure ordinary furniture. If the article is highly polished, care should be taken to prevent the hot water from coming in contact with anything but the cane.

Cleaner for a Stovepipe

A long horizontal pipe for a stove soon fills with soot and must be cleaned. The usual method is to beat the pipe after taking it down to be cleaned, but a much better device for the purpose is shown in the sketch.

A scrub brush is procured and cut in two, the parts being hinged to a cross-piece fastened to a long broom handle. The brushes are pressed outward



against the inside surfaces of the pipe with a wire and spring, as shown.—Contributed by C. L. Herbert, Chicago, Illinois.

How to Make a Toy Derrick

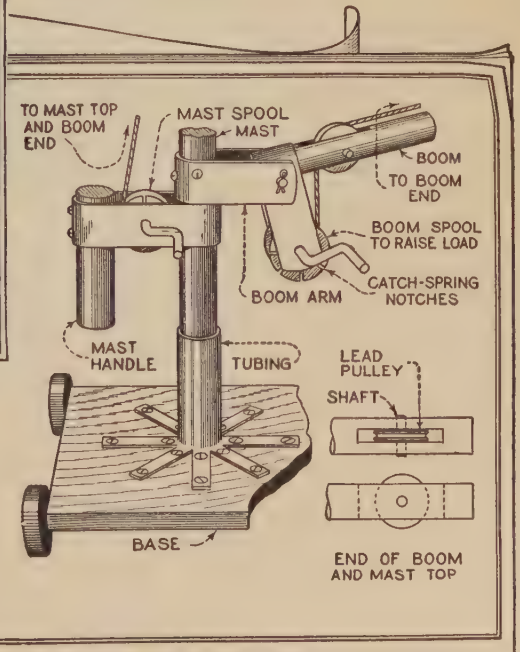
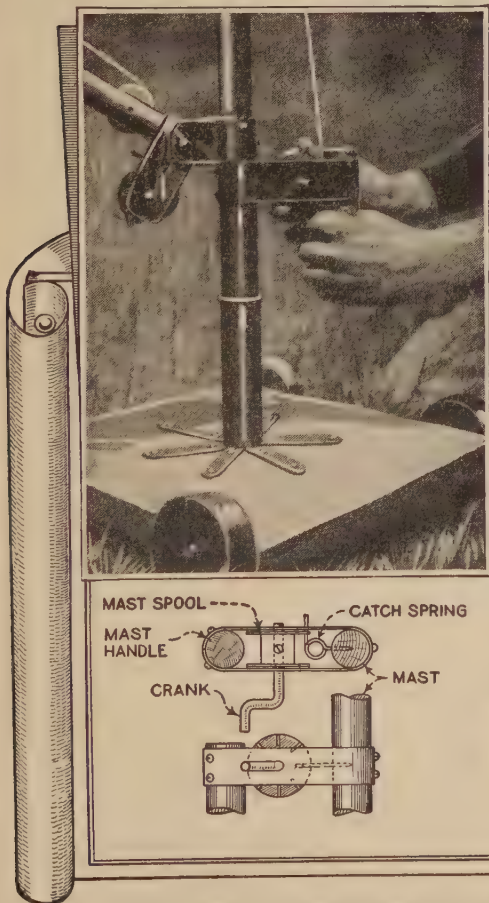
By RICHARD C. TARR

A TOY derrick to amuse the growing boy may be constructed without much trouble and at little cost to the home workman, or by the boy himself, and will stand up under considerable rough usage.

A base, 12 in. square, is first constructed of $\frac{7}{8}$ -in. pine, battened at the ends to prevent warping, and provided with four wheels, cut from the same material with a coping saw or jigsaw, bored, and attached with screws to the four corners of the base. The socket for the mast is of brass tubing slightly larger than the mast, and having one end slit eight times, lengthwise, about 4 in. in from one end. The slitting is done with a hacksaw. These sections of the tubing are then spread out, drilled and screwed to the top of the base, keeping the tubing rigidly in an upright position. The socket of the derrick pictured was made from a discarded tire

pump. The mast is constructed of a 1 by 36-in. dowel stick, the boom is $\frac{7}{8}$ by 22 in. and the mast handle is 1 by 4 in., all being dowel stock, which can be obtained from any large hardware store, or a dealer in manual training supplies. A footplate should be screwed to the bottom if a hole is bored through the base to secure additional depth for the mast socket; however, this is not necessary if the mast is permitted to rest directly on the base.

The pulleys at the top of the mast and ends of the boom are of cast lead, grooved with a hacksaw around the edge, and smoothed with sandpaper. Oblong openings are cut, slightly larger than the pulleys, in both ends of the boom and in the top end of the mast, about $\frac{1}{2}$ in. from the end of the mast and the outer end of the boom, and $1\frac{1}{2}$ in. from the inner end of the boom. The pulleys are then wedged in place temporarily with cardboard in their respective openings. Holes, $\frac{3}{16}$ in. in diameter, are bored through wood and pulley, the latter removed, and the hole in it reamed slightly larger. The pulley is then replaced, and a short piece of stiff wire, or wire nail, forced into the hole, for the pulley to turn on. Care should be taken to bore the hole squarely to avoid binding the pulley.



Close-Up View of the Derrick Base and Pulley Fittings, and Details of Construction of the Various Parts of the Toy

The arm securing the handle to the mast is $\frac{1}{16}$ by 1 by 12 in., the boom arm, $\frac{1}{16}$ by 1 by 6 in., and the spool bracket,

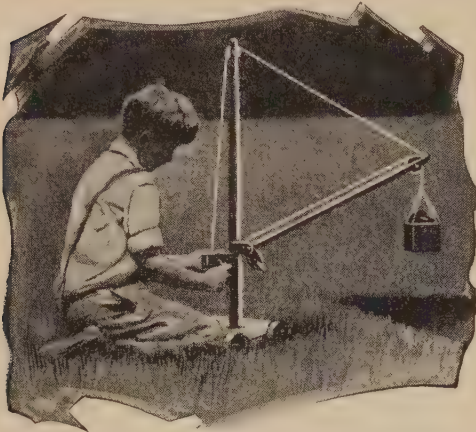


Photo of the Completed Toy Derrick in Use, with a Miniature Bucket at the End of the "Cable"

$\frac{1}{16}$ by 1 by 7 in., all sheet brass. The sketch shows their construction. The notches for the catch springs are made by drilling a series of $\frac{1}{16}$ -in. holes in the sides of the spools in the places indicated, cutting smooth slits with a small chisel or broach and polishing with fine emery cloth. The catch springs, which hold the spools from turning when in use, and which are held back with one hand while operating the crank with the other, are rather tricky to place in the small holes bored into the mast and boom for them, but once placed will hold their position and work perfectly. The boom swings, within the boom arm, on a pivot made of a length of wire nail, drilled at the ends and held in place with small cotter pins or wire.

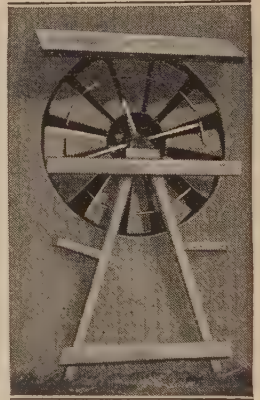
The construction of the spools can be readily understood from the sketches. Sheet brass, $\frac{1}{16}$ in. thick, is used for the

sides, and a $\frac{3}{4}$ -in. length of dowel for the centers. Two $3\frac{1}{2}$ -in. lengths of wire serve as cranks, held in place by small brass screws driven into the spool centers, after the cranks are in place.

Lead weights placed on the outer edge of the base will prevent any tendency toward tipping when in use. The woodwork should be given one or two coats of white shellac, and may be stained, if desired, to any finish.

Windmill Exhaust Fan

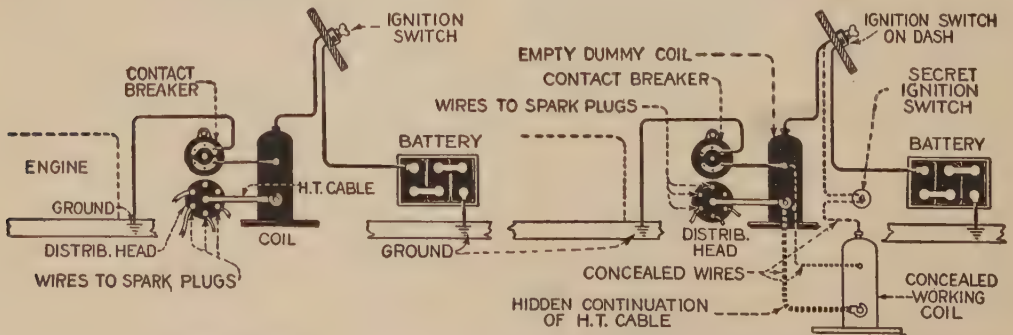
Satisfactory results have been obtained with an exhaust fan made from an old windmill. The arrangement is clearly shown in the accompanying photo. A circular hole, about 4 in. larger than the diameter of the windmill wheel, was cut in the wall, and the wheel was then carefully mounted



with bearings on the inside and outside, and a 10-in. pulley was keyed to the inside end of the shaft. This was belted to a small electric motor, so that the wheel made approximately 200 revolutions per minute. Obviously a large volume of air is displaced with this wheel in a short time.—Dale R. Van Horn, Walton, Nebr.

Preventing Auto Theft

Theft of his automobile, with snap-on wires and a burned-out ignition coil in



FACTORY WIRING

MODIFIED WIRING SCHEME USING DECOY COIL

Altering the Wiring System of an Auto and Substituting a Decoy Coil for the Regular Coil, Which Is Hidden, Make Car Theft-Proof

dicating the means by which the machine was taken, recently led a motorist to devise a plan to prevent this from happening again. The scheme involved the use of two coils; a dead one, occupying its usual place on the dash and acting as a decoy, and a carefully concealed working coil, to furnish the actual ignition current.

The problem had its obvious difficulties. If the wires leading from the decoy coil to the circuit breaker, ground and dash switch were to remain intact so as to give the appearance of undisturbed regularity, then it seemed necessary to run wires between these places and the working coil. Naturally this would not do, as the sight of two sets of wires would give the scheme away to the practiced eye of the expert crook. The illustration shows, at the left, the standard, factory-wired ignition system of the car, the ammeter and other minor details having been omitted for the sake of simplicity. The theft-proof wiring is shown at the right, the additional wires being marked as dotted lines. All visible coil connections appear as made at the factory. The wire that runs from the top of the decoy coil to the dash switch is a blind wire; it has copper connectors at both ends, but they are so attached that no electrical contact is made. The wire connecting the circuit breaker to the dead coil is continued through the hollow dummy coil and passed through a hole in the dash to the corresponding terminal on the concealed working coil. The high-tension cable connecting the dummy with the distributor head, is similarly fastened to the

high-tension terminal of the working coil. Lastly, a wire is run from the top of the operating coil to the dashboard switch and a second, secret switch serves as additional protection. While ignition coils differ in shape and in electrical hookup, the principle of this wiring scheme may be applied to practically any car. No detour winding or bridging of the switch, not even the possession of the proper switch key, will be of the slightest help to the thief or unauthorized user as long as he remains unaware of the second coil.

Poultry Watering Trough

Old auto casings may be used to advantage in the poultry yard by cutting holes



Using Old Auto Casings as Watering Troughs for Poultry

through one side of them, placing them flat on the ground and filling them with water. The holes are readily cut with a saw. Do not cut through the beads of the casing and cut only halfway down the tread, as shown in the drawing. The two beads of the casing lie close together, which keeps out most of the dirt.

"Swinging Darkey" Toy Amuses Children

Although the principle of the toy shown in the illustration is not new, this adaptation

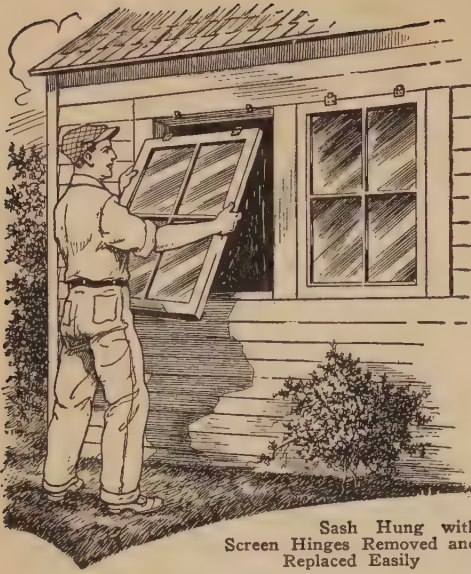


This Swinging Head Proves Popular with the Youngsters

is quite novel and will prove popular with the youngsters. It consists of a comic head cut from a magazine and glued to a piece of stiff cardboard. This is mounted on a small block of wood, a length of wire and a weight are attached to the block as indicated,

and wire pins are provided under it to serve as pivots. The wire holding the counterweight must be bent so that the head will stand upright when the device is set on the table. A fishline sinker may be used for a counterweight. A swinging movement is imparted to the coun-

terweight and will cause a similar rocking of the head.



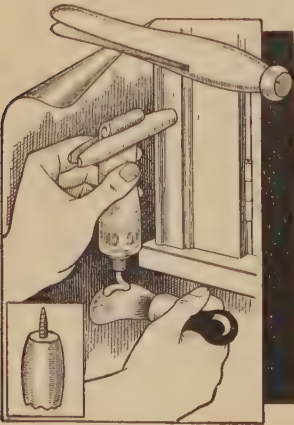
Sash Hung with
Screen Hinges Removed and
Replaced Easily

Hanging Sash on Poultry House

Sash on poultry houses should be hung so that they can be easily and quickly removed or replaced. A good method of doing this is to use screen or storm-sash hinges, as shown in the accompanying illustration. With these hinges the removal of sash is but a few moments' work. They may be taken down in the morning and replaced at night, or in case a storm comes up, with little trouble.—Rufus E. Deering, Clements, Kans.

New Use for Clothespin

Tubes of tooth paste or shaving cream usually find temporary resting places on the window sills or on shelves in the medicine cabinet and in either place they are often mashed. To put the tubes where



they can readily be seen, and on the theory of a "place for everything and everything in its place," it was found that clothespins make satisfactory tube holders. The old-fashioned type of wooden pins should be used for

this purpose, care being taken to select straight-grained ones. The head is cut off and a hole drilled through the shank for a woodscrew. A coat of white paint, and a minute's work fastening the holders to the cabinet, or wall, complete the job.—Chester Lynndelle, Trenton, N. J.

Hot-Water Bag Makes Portable Gas Can

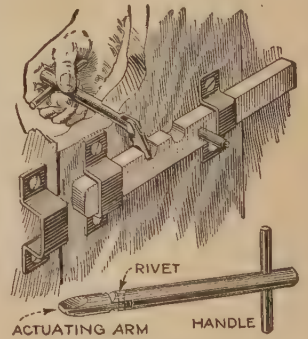
An old hot-water bag will be found very useful to the motorist. It takes up little space under the seat or in a door pocket, and, in an emergency, can be used to carry sufficient gasoline to enable the driver to reach the nearest service station. It can also be used to carry water for the radiator, or for any other purpose for which a pail is usually carried.—Maynard Bodley, St. Paul, Minn.

Novel Door Latch

Resting on two flat-iron brackets, the door bolt shown in the drawing is actuated by means of a key that engages in notches cut in the top. A small round hole, about $\frac{1}{4}$ in. in diameter, is the only

outside clue to the presence of the bar. The brackets are bent to the shape shown and screwed to the door, and a similar bracket is screwed to the door post to catch the bar when the door is

locked. The key is made in two parts, cut from $1\frac{1}{4}$ -in. stock. These are joined together with a rivet, one part being slotted to a depth of $\frac{3}{16}$ in. and wide enough to fit freely over the shank formed by the other, the rivet being placed where it will permit freedom of movement. The key is pushed through the hole in the door; the end drops down engaging one of the notches in the bolt and, as the key is turned, will drive it one way or the other to open or lock the door. The shank of the pivoted end should be rounded on top to permit withdrawal of the key. A stop pin is screwed into the bar to prevent it from coming out of the brackets.—John McNeish, Boston, Mass.



Imitation Arms and Armor

PART I

Genuine antique swords and armor, as used by the knights and soldiers in the days of old, are very expensive and at the present time practically impossible to obtain. The accompanying illustration shows four designs of swords that anyone can make, and if carefully made, they will look very much like the genuine article.

The drawings are so plain that the amateur armorer should have very little difficulty, if any, in building up his work from the illustrations, whether he requires a single sword only, or a complete suit of armor, full size.

The pieces or designs in this article are from authentic sources, says the *English Mechanic*, so that where names are given the amateur can so label them, and will thereby greatly add to their interest and value.

An executioners' sword of the fifteenth century is shown in Fig. 1. The blade should be about 27 in. long with a handle of sufficient length to be grasped by both hands. The width of the blade near the handle is about $2\frac{1}{2}$ in., tapering down to $1\frac{1}{2}$ in. near the point end. Several ridges are cut around the handle to permit a firm grip. The cross guard is flat and about 1 in. in width.

Mark out the shape and size of the blade on a piece of wood $\frac{1}{8}$ in. thick, using a straightedge and a pencil, and allowing a few inches more in length on which to fasten the handle. Cut out the wood with a scroll saw or a key-hole saw, trim the edges down thin and smooth both surfaces with fine sandpaper. The end for the handle is cut about 1 in. wide and 2 in. long. The cross guard is cut out and a hole made

in the center through which to pass the handle end of the blade. The handle is next made, and if the amateur does not possess a lathe on which to turn the shape of the handle, the ridges around the wood may be imitated by gluing and tacking on pieces of small rope. The handle is then mortised to receive the 1 by 2-in. end of the blade. The cross guard is now glued and placed



Fig. 1



Fig. 2



Fig. 3



Fig. 4

on the blade, then the hole in the handle is well glued with glue that is not too thick and quite hot. The blade with the cross guard is inserted in the handle and allowed to set. When the glue is thoroughly dry, remove the surplus with a sharp knife and paint the handle with brown, dark red, or green oil paint. The blade is covered with tinfoil to give it the appearance of steel. Secure some pieces of tinfoil and cut one strip $\frac{1}{2}$ in. wider than the blade and the other $\frac{1}{4}$ in. narrower. Quickly paint the blade well with thin glue on one side, then lay evenly and press on the narrow strip of tinfoil. Glue the other side of the blade, put on the wider strip of tinfoil and glue the

overlapping edge and press it around and on the surface of the narrow strip. The cross guard must be covered with tinfoil in the same manner as the blade. When the whole is quite dry, wipe the blade with light strokes up and down several times, using a soft and dry piece of cloth. The sword is then ready to hang in its chosen place as a decoration, not for use only in cases of tableaux, for which this article will be especially useful to those who are arranging living pictures wherein swords and armor are part of the paraphernalia.

A Chinese scimitar is shown in Fig. 2. The handle of this sword is oval and covered with plaited cord. In making this scimitar, follow the directions as for Fig. 1, except that the handle has to be covered with a round black cord. If it is found difficult to plait the cord on the handle as in the illustration, wind it around in a continuous line closely together, and finish by fastening with a little glue and a small tack driven through the cord into the handle. The pommel is a circular

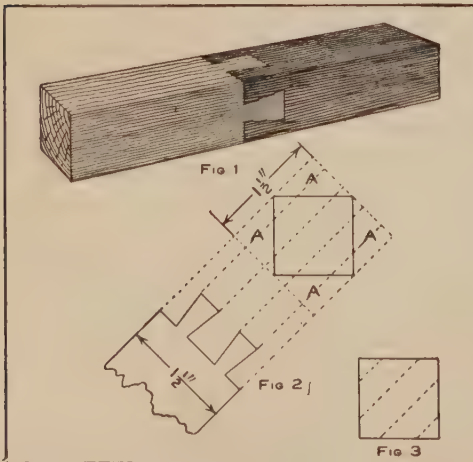
piece of wood, $\frac{1}{8}$ in. thick and 5 in. in diameter. The length of the handle, allowing for a good hold with both hands, should be about 9 in., the length of the blade 28 in., the width near the pommel $1\frac{1}{2}$ in. and 3 in. in the widest part at the lower end. The sharp or cutting edge is only on the short side, the other is flat or half-round.

A Turkish sabre of ancient manufacture from Constantinople is shown in Fig. 3. The handle is painted a dull creamy white in imitation of ivory. The enamel paint sold in small tins will answer well for this purpose. The cross guard and blade are covered as described in Fig. 1. The sharp edge is on the longer curved side, the other is flat or half-round.

A two-handed sword used in the 14th and 15th centuries is shown in Fig. 4. This sword is about 68 in. long, has a cross guard and blade of steel with a round wood handle painted black. The ball or pommel on top of the handle is steel. Both edges of the blade are sharp. This sword is made in wood the same as described for Fig. 1.

A Dovetail Joint Puzzle

A simple but very ingenious example in joinery is illustrated. In the finished piece, Fig. 1, the dovetail appears on each side of the square stick of



How the Joint Is Cut

wood, the illustration, of course, shows only two sides, the other two are identical. The joint is separable and each part is solid and of one piece. In making, take two pieces of wood, preferably of contrasting colors, such as cherry and walnut or mahogany and boxwood, about $1\frac{1}{2}$ in. square and of any length desired. Cut the dovetail on one end of each stick as shown in Fig. 2, drive together and then plane off the triangular corners marked A. The end of each piece after the dovetails are cut appear as shown in Fig. 3, the lines marking the path of the dovetail through the stick.

Pure rain water is the best to use in a cooling system of an automobile engine, as it is free from the mineral substances which are deposited in the radiator, piping and jackets by hard water.

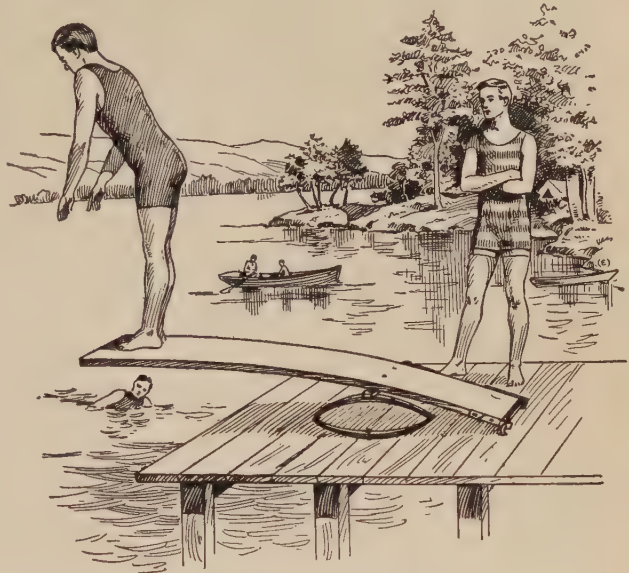
Springboard for Swimmers

A good springboard adds much to the fun of swimming. The boards are generally made so that the plank will bend, being dressed down thin at one end and fastened. The thinness of the plank, or an insecure fastening, causes many a plank to snap in two or come loose from its fastenings in a short time.

The accompanying sketch shows the method of constructing a springboard that does not depend upon the bending of the wood for its spring. It is made of a plank, 2 in. thick and from 14 to 16 ft. long, one end of which is secured with a hinge arrangement having a U-shaped rod whose ends are held with nuts. On each edge of the board, at the lower end, are fastened two pieces of strap iron, each about 1 ft. long and with the lower ends drilled to fit the horizontal of the U-shaped rod.

Secure a pair of light buggy springs from a discarded rig and attach them

to the ends of a square bar of iron having a length equal to the width of the plank. Fasten this to the plank with bolts, as shown in the sketch. Should the springs be too high they can be



Buggy Springs Used beneath the Board

moved forward.—Contributed by John Blake, Franklin, Mass.

Taking Button from a Child's Nostril

A three-year-old child snuffed a button up its nostril and the mother, in an attempt to remove it, had caused the button to be pushed farther up the channel. Doctors probed for the button without success. The distracted mother happened to think of snuff, and, as there was some at hand, took a pinch of snuff between the thumb and forefinger and held it close to the child's nose. The violent sneezing caused the button to be blown out. Such an accident may come under the observation of any parent, and if so, this method can be used to relieve the child when medical assistance is not at hand.—Contributed by Katharine D. Morse, Syracuse, N. Y.

Brass Frame in Repoussé

Punches can be purchased, as can the pitch bed or block. Both can be made easily, however. Several punches of different sizes and shapes will be needed. A piece of mild steel, about $\frac{3}{8}$ in. square, can be easily worked into tools shaped as desired. A cold chisel will be needed to cut the metal to length; a file to reduce the ends to shape, and a piece of emery paper to smooth and polish the end of the tool so that it will not scar the metal.

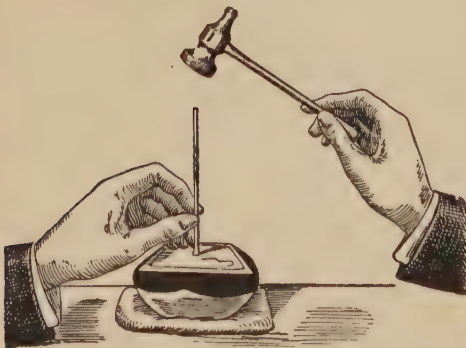
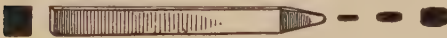
A small metal box must be secured to hold the pitch. The illustration shows an iron receptacle. The pitch is prepared by heating the following materials in these proportions: pitch, 5 lb.; plaster of Paris, 5 lb.; tallow, $\frac{1}{2}$



Design for the Frame

1b. To put it in another way, use pitch and plaster in equal parts with 1/10 part tallow. See that the pitch and plaster are dry so that the moisture will not cause the pitch to boil over. Keep stirring the mass so that it never boils. Melt the pitch first and add the plaster by degrees.

For a piece of repousse such as the frame shown, secure a piece of brass of about No. 18 gauge. With carbon paper trace the design on the brass. Place the metal on the pitch bed and work over the outline of the design. Use the chisel-edged tool and try to



Working Out the Design

make the lines continuous. When this has been done, heat the pitch slightly

and place the metal, design down, on the pitch, and with the raising punches work up the shape as desired after the pitch has hardened. When the desired form has been obtained, turn the metal over and "touch up" any places improperly raised. The metal will probably be warped somewhat. To remedy this, place a board on the metal and pound until the metal assumes a flat shape again. Next drill a hole in the center waste and saw out for the opening, using a small metal saw. Trim up the edges and file them smooth.

Clean the metal thoroughly, using powdered pumice with lye. Cotton batting fastened to the end of a stick will make a good brush. Upon the cleansed metal put a lacquer to prevent tarnishing. Metal clips may be soldered to the back to hold the picture in place and also a metal strip to hold the frame upright. These should be placed before the metal is lacquered.

Finding the Horsepower of Small Motors

A small motor often excites curiosity as to its true horsepower, or fraction of a horsepower. Guesses in this direction vary remarkably for the same motor or engine. It is comparatively easy to determine the horsepower put out by almost any machine by the following method which is intended for small battery motors and small steam engines.

Before giving the description, it may be well to know what horsepower means. Horsepower is the rate of work and a unit is equal to 33,000 ft. lb. per minute, or 550 ft. lb. per second. That is lifting 33,000 lb. 1 ft. in one minute or 550 lb. 1 ft. in one second. This may be applied to the problem of finding the horsepower of a motor by fastening a piece of twine about 25 ft. long to the shaft of the engine or motor to be tested in such a way that when the shaft revolves it will wind up the string similar to a windlass. Place the motor in such a position that the twine will hang freely without touching anything; out of a high win-

dow will do. Fasten a weight to the other end of the line as heavy as the motor or engine can lift and still run. It must weigh enough to slow the power down a little, but not to stop it. Mark the position of the weight and start the motor, at the same time accurately measuring time in minutes and seconds it takes to lift the weight from the lowest point to the highest. Next measure accurately the distance in feet covered by the weight in its ascent and obtain the correct weight in pounds of the weight.

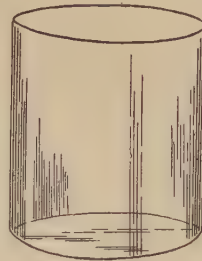
Multiply the weight by the distance covered and divide the result by the number of minutes or fraction of a minute obtained and divide this last result by 33,000 and the quotient will be the horsepower of the motor or engine.

Perhaps an illustration will make this solution much plainer. Suppose the motor will lift a weight of 1 lb. and still revolve, 30 ft. in 10 seconds or $1/6$ of a minute. Multiplying 1 by 30 we get 30, which divided by $1/6$ gives 180. This in turn divided by 33,000 equals in round numbers $1/200$ part of a horsepower.—Contributed by Harold H. Cutter.

Illusion for Window Attraction

Gold fish and canary birds, living together in what seems like one receptacle, make an unusual show window attraction. Secure two glass vessels having straight sides of the same height, one 18 in. in diameter (Fig. 1) and the other 12 in. in diameter (Fig. 2). The smaller is placed within the larger, the bottoms being covered with moss and aquarium decorations which can be purchased at a bird store. Fill the 3-in. space between the vessels with water. Cut a piece of galvanized screen into circular form to cover the larger vessel, and hang a bird swing, A, Fig. 3, in the center. Place the screen on top of the vessels so that the swing will hang in the center of the inner vessel. A weight—a box filled with sand will do—should be placed on top of the screen, over the smaller vessel, to keep

it from floating. Moss should be put over the top of the screen so that the two separate vessels can not be seen.



18 in. Diameter
Fig. 1



12 in. Diameter
Fig. 2

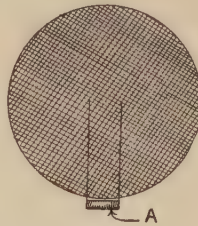


Fig. 3

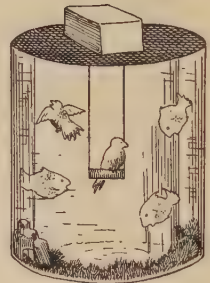


Fig. 4

Birds and Fish Apparently Together

Place the birds in the inner vessel and the fish in the water. The effect is surprising. To complete the effect and aid the illusion the vessels can be set in a box lined with black velvet, or on a pedestal.—Contributed by J. F. Campbell, Somerville, Mass.

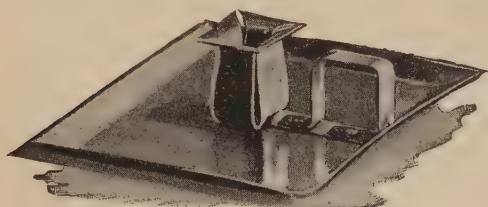
Cleaner for White Shoes

Finely ground whiting mixed with water to the consistency of paste makes a very good coating for white shoes. A brush can be used in applying the mixture which will dry in a few minutes. It is best to mix only as much paste as required for immediate use.—Contributed by L. Szerlip, Brooklyn, N. Y.

☞ Belt laces should never cross on the side next to the pulley as they will cut themselves in two.

How to Make a Candlestick Holder

A candlestick of very simple construction and design can be made as follows: Secure a piece of brass or



Candle Holder Complete

copper of No. 23 gauge of a size sufficient to make the pieces detailed in the accompanying sketch. A riveting hammer and a pair of pliers will be needed, also a pair of tin shears and a piece of metal upon which to rivet.

Cut out a piece of metal for the base to a size of $5\frac{1}{2}$ by $5\frac{1}{2}$ in. Trim the sharp corners off slightly. Draw a pencil line all around the margin and $\frac{5}{8}$ in. away from the edge. With the pliers shape the sides as shown in the illustration.

Next lay out the holding cup according to the plan of development shown, and cut out the shape with the shears. Polish both of these pieces, using any of the common metal polishes. Rivet the cup to the base, and then, with the pliers, shape the sides as shown in the photograph. The manner of making and fastening the handle is clearly illustrated. Use a file to smooth all the cut edges so that they will not injure the hands.

In riveting, care should be taken to round up the heads of the rivets nicely as a good mechanic would. Do not be content merely to bend them over. This rounding is easily accomplished by striking around the rivets' outer circumference, keeping the center high.

A good lacquer should be applied after the parts have been properly cleaned and polished, to keep the metal from tarnishing.

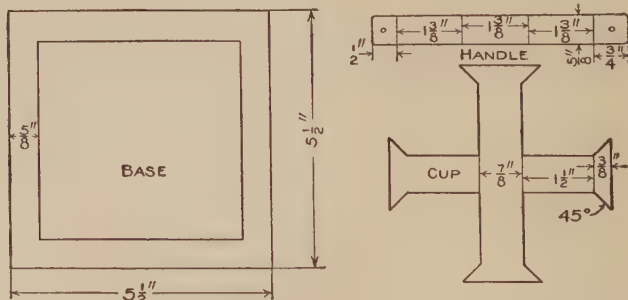
A Home-Made Duplicator

The usual gelatine pad, which is the principal part of the average hectograph or duplicator, is, as a rule, unsatisfactory, as it is apt to sour and mold in the summer and freeze in the winter, which, with other defects, often render it useless after a few months service.

A compound that is almost indestructible is the preparation sold at art stores as modeling clay. This clay is as easily worked as a putty and is spread into the tray, which may be of wood or tin, and the surface leveled by pounding with a mallet or hammer, then by drawing a straightedge over it.

The surface of the pad is now saturated with pure glycerine. This is poured upon the surface after it is slightly warmed, covering the same and then laying a cloth over the pad and allowing it to stand long enough for the clay to absorb the glycerine, after which it is ready for use.

The original copy is written with a copying pencil or typewritten through a hectograph ribbon. A sheet of newspaper is laid upon the pad and a round stick or pencil is passed over it



Details of Candle Holder

to make the surface level and smooth. Remove the newspaper and place the original copy face down on the leveled surface and smooth it out in the same way so that every part touches the pad. Remove the copy in about five minutes and place the clean sheets of paper one after another on the surface and remove them. From 50 to 75 copies of the original can be made in a short time.

This compound is impervious to water, so the negative print is removed by simply washing with a damp sponge, the same as removing writing from a slate. This makes it possible to place another original on the pad immediately without waiting for the ink to vanish by chemical action as in the original hectograph.

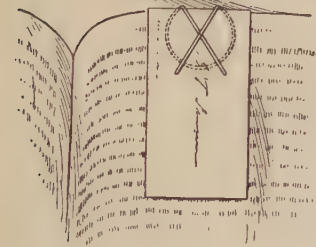
The action of the weather has no effect upon this compound and it is proof against accident, for the tray may be dropped and the pad dented or cut into pieces, and the clay can be pressed back and leveled. The only caution is to keep it covered with a cloth saturated in glycerine while not in use.—Contributed by A. A. Houghton, Northville, Mich.

Paper-Clip Bookmark

The combination of a paper clip and a calling card makes a good book-

mark. The clip and card can be kept together by piercing the card and bending the ends of

the wire to stick through the holes. The clip is attached to a page as shown in the sketch.—Contributed by Thos. DeLoof, Grand Rapids, Mich.



Aerating Water in a Small Tank

A simple way of producing air pressure sufficient to aerate water is by the use of a siphon as shown in Fig. 1. The siphon is made of glass tubes, the longer pieces being bent on one end as shown. The air receiver and regulating device are attached to the top end of the lower tube, as shown in Fig. 2. The receiver or air inlet is the most important part. It is made of a glass

tube, $\frac{3}{4}$ in. in diameter and 5 in. long. A hole is filed or blown through one side of the glass for the admission of air. The ends of the smaller glass

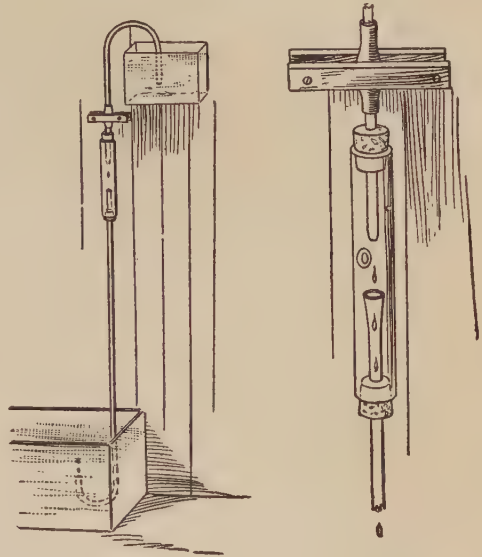


FIG. 1

FIG. 2

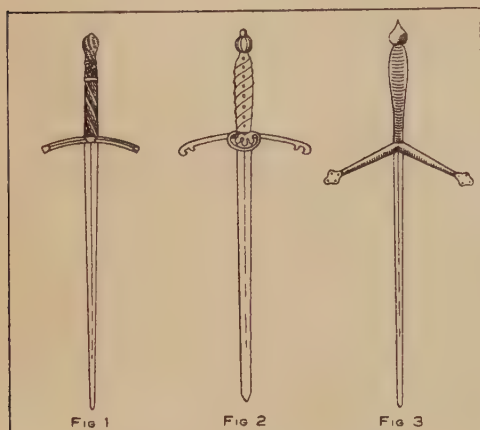
Forcing Air Through Water

tubes are passed through corks having a diameter to fit the ends of this larger tube. The ends of these tubes should be so adjusted that the continuous drops of water from the upper will fall into the tube below. The succession of air bubbles thus imprisoned are driven down the tube and into the tank below.

The regulator is placed in the tube or siphon above the air receiver. Its purpose is to retard the flow of water from the siphon above and make it drop rapidly. It consists of a rubber connecting tube with two flat pieces of wood clamped over the center and adjusted with screws. The apparatus is started by clamping the rubber tube tightly and then exhausting the air in the siphon tube, then placing the end in the upper reservoir and releasing the clamp until the water begins to drop. If the reservoir is kept filled from the tank, the device will work for an indefinite time.—Contributed by John T. Dunlop, Shettleston, Scotland.

Imitation Arms and Armor—Part II

Imitation swords, stiletos and battle-axes, put up as ornaments, will look well if they are arranged on a shield which is hung high up on a wall of a room or hall, says the English



Three Fifteenth Century Swords

Mechanic, London. The following described arms are authentic designs of the original articles. A German sword of the fifteenth century is shown in Fig. 1. This sword is 4 ft. long with the crossguard and blade of steel. The imitation sword is made of wood and covered with tinfoil to produce the steel color. The shape of the sword is marked out on a piece of wood that is about $\frac{1}{8}$ in. thick with the aid of a straightedge and pencil, allowing a little extra length on which to fasten the handle. Cut the sword out with a saw and make both edges thin like a knife blade and smooth up with sandpaper. The extra length for the handle is cut about 1 in. in width and 2 in. long. The handle is next carved and a mortise cut in one end to receive the handle end of the blade. As the handle is to represent copper, the ornamentations can be built up of wire, string, small rope and round-headed nails, the whole finally having a thin coat of glue worked over it with a stiff bristle brush and finished with bronze paint.

The crossbar is flat and about 1 in.

in width. Cut this out of a piece of wood and make a center hole to fit over the extra length on the blade, glue and put it in place. Fill the hole in the handle with glue and put it on the blade. When the glue is thoroughly dry, remove all the surplus with a sharp knife. Sheets of tinfoil are secured for covering the blade. Cut two strips of tinfoil, one about $\frac{1}{2}$ in. wider than the blade and the other $\frac{1}{4}$ in. narrower. Quickly cover one side of the blade with a thin coat of glue and evenly lay on and press down the narrow strip of tinfoil. Stick the wider strip on the other side in the same way, allowing equal margin of tinfoil to overlap the edges of the blade. Glue the overlapping edges and press them around on the surface of the narrow strip. The crossguard must be covered in the same manner as the blade. When the whole is quite dry, wipe the blade up and down several times with light strokes using a soft rag.

The sword shown in Fig. 2 is a two-handed Swiss sword about 4 ft. in length, sharp on both edges with a handle of dark wood around which is wound spirally a heavy piece of brass or copper wire and held in place with round-headed brass nails. The blade and crossbar are in imitation steel. The projecting ornament in the center of the crossguard may be cut from heavy pasteboard and bent into shape, then glued on the blade as shown.

In Fig. 3 is shown a claymore, or Scottish sword of the fifteenth century. This sword is about 4 ft. long and has a wood handle bound closely around with heavy cord. The crossbar and blade are steel, with both edges sharp. A German poniard is shown in Fig. 4. This weapon is about 1 ft. long, very broad, with wire or string bound handle, sharp edges on both sides. Another poniard of the fourteenth century is shown in Fig. 5. This weapon is also about 1 ft. long with wood handle and steel embossed blade. A sixteenth century German poniard is shown in Fig. 6. The blade and ornamental

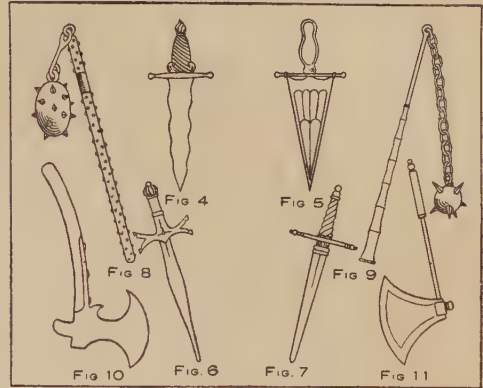
crossbar is of steel, with both edges of the blade sharp. The handle is of wood. A German stiletto, sometimes called cuirass breakers, is shown in Fig. 7. This stiletto has a wood handle, steel crossbar and blade of steel with both edges sharp.

In Fig. 8 is shown a short-handled flail, which is about 2½ ft. long with a dark handle of wood, studded with brass or steel nails. A steel band is placed around the handle near the top. The imitation of the steel band is made by gluing a piece of tinfoil on a strip of cardboard and tacking it to the handle. A large screweye is screwed into the top of the handle. The spiked ball may be made of wood or clay. Cover the ball with some pieces of linen, firmly glued on. When dry, paint it a dark brown or black. A large screweye must be inserted in this ball, the same as used on the end of the handle, and both eyes connected with a small piece of rope twisted into shape. The rope is finished by covering with tinfoil. Some short and heavy spike-headed nails are driven into the ball to give it the appearance shown in the illustration.

A Russian knout is shown in Fig. 9. The lower half of the handle is of wood, the upper part iron or steel, which can be imitated by covering a piece of wood that is properly shaped with tinfoil. The whole handle can be made of wood in one piece, the lower part painted black and the upper part covered with tinfoil. A screweye is screwed into the upper end. A length of real iron or steel chain is used to connect the handle with the ball. The ball is made as described in Fig. 8. The spikes in the ball are about 1 in. in length. These must be cut from pieces of wood, leaving a small peg at the end and in the center about the size of a No. 20 spike. The pegs are glued and inserted into holes drilled into the ball.

In Fig. 10 is shown a Slavonic horseman's battle-axe which has a handle of wood painted dark gray or light brown; the axe is of steel. The blade is cut from a piece of ¼-in. wood with a keyhole saw. The round part is

made thin and sharp on the edge. The thick hammer side of the axe is built up to the necessary thickness to cover



Ancient Weapons

the handle by gluing on pieces of wood the same thickness as used for the blade, and gradually shaping off to the middle of the axe by the use of a chisel, finishing with sandpaper and covering with tinfoil. Three large, round-headed brass or iron nails fixed into the front side of the handle will complete the axe.

At the beginning of the sixteenth century horseman's battle-axes shaped as shown in Fig. 11 were used. Both handle and axe are of steel. This axe is made similar to the one described in Fig. 10. When the woodwork is finished the handle and axe are covered with tinfoil.

How to Make a Round Belt Without Ends

A very good belt may be made by laying several strands of strong cord, such as braided fishline, together as shown in Fig. 1 and wrapping them as



Method of Forming the Belt

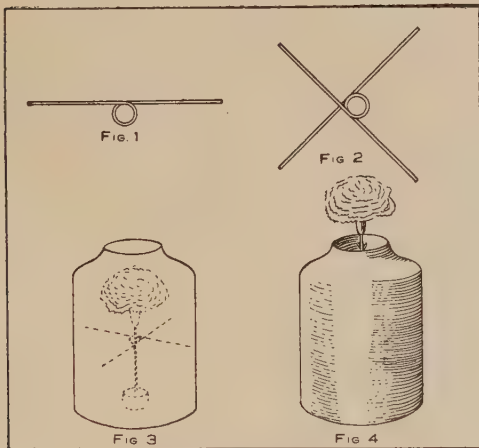
shown in Fig. 2. When wrapped all the way around, the ends are tied and cut off. This will make a very good flexible belt; will pull where other belts

slip, and as the tension members are all protected from wear, will last until the wrapping member is worn through without being weakened.—Contributed by E. W. Davis, Chicago.

Old-Time Magic

The Growing Flower

This trick is performed with a wide-mouthed jar which is about 10 in. high. If an earthen jar of this kind is not at hand, use a glass fruit jar and cover it with black cloth or paper, so the con-



Flower Grows Instantly

tents cannot be seen. Two pieces of wire are bent as shown in Fig. 1 and put together as in Fig. 2. These wires are put in the jar, about one-third the way down from the top, with the circle centrally located. The wires can be held in place by carefully bending the ends, or using small wedges of wood.

Cut a wire shorter in length than the height of the jar and tie a rose or several flowers on one end. Put a cork in the bottom of the jar and stick the opposite end of the wire from where the flowers are tied through the circle of the two wires and into the cork. The dotted lines in Fig. 3 show the position of the wires and flowers.

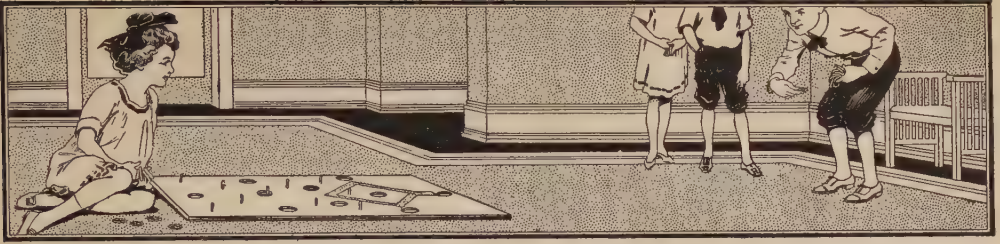
To make the flowers grow in an instant, pour water into the jar at one side of the wide mouth. The cork will float and carry the wire with the flowers

attached upward, causing the flowers to grow, apparently, in a few seconds' time. Do not pour in too much water to raise the flowers so far that the wire will be seen.—Contributed by A. S. Macdonald, Oakland, Calif.

Water and Wine Trick

This is an interesting trick based on the chemical properties of acids and alkalis. The materials needed are: One glass pitcher, filled with water, four glass tumblers, an acid, an alkali and some phenolphthalein solution which can be obtained from your local druggist. Before the performance, add a few drops of the phenolphthalein to the water in the pitcher and rub a small quantity of the alkali solution on the sides of two of the tumblers and repeat, only using as large a quantity of the acid as will escape notice on the remaining tumblers. Set the tumblers so you will know which is which and proceed as follows: Take hold of a prepared tumbler with the left hand and pour from the pitcher, held in the right hand, some of the liquid. The liquid turned into the glass will become red like wine. Set this full tumbler aside and take the pitcher in the left hand and pour some of the liquid in one of the tumblers containing the acid as it is held in the right hand. There will be no change in color. Repeat both parts in the same order then begin to pour the liquids contained in the tumblers back into the pitcher in the order reversed and the excess of acid will neutralize the alkali and cause it to lose its color and in the end the pitcher will contain a colorless liquid.—Contributed by Kenneth Weeks, Bridgeton, N. J.

The life of iron shingle nails is about 6 years. An iron nail cannot be used again in putting on a new roof. Solid zinc nails last forever and can be used as often as necessary. As zinc is much lighter than iron, the cost of zinc nails is only about $2\frac{1}{2}$ times that of iron nails.

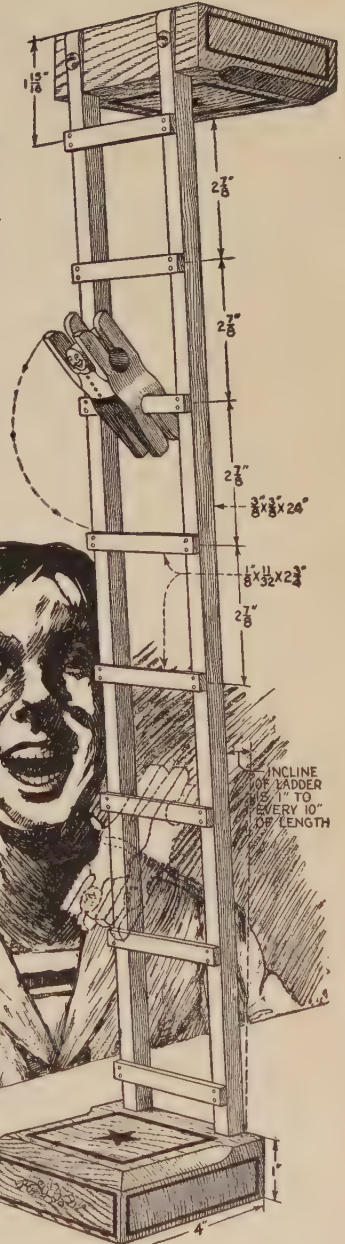


Making a "Tumbling Teddy"

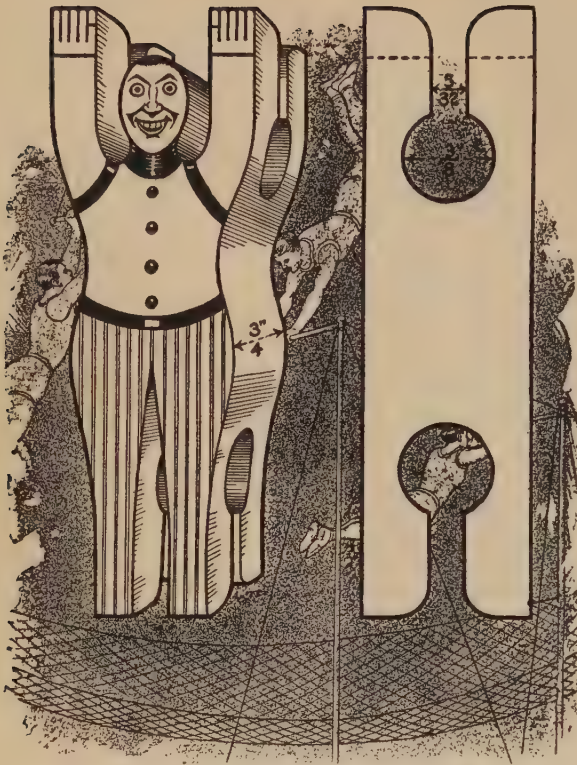
By E. R. HAAN

THE toy described in this article is very simple to make, but will provide endless amusement for the youngsters. No special tools, other than those to be found around the average home, are needed for its construction; a scroll or coping saw is useful for cutting out the figure of "Teddy" himself, but, in the absence of this tool, the figure can quite easily be cut with a knife, if a little care is used in the operation.

The ladder is the first thing to make. This is formed from two lengths of $\frac{3}{8}$ by $\frac{3}{8}$ -in. wood, 24 in. long, with eight rungs of $\frac{1}{8}$ by $1\frac{1}{2}$ -in. stuff, each $2\frac{3}{4}$ in. long, spaced exactly $2\frac{7}{8}$ in. apart. The rungs are fastened to the sides of the ladder with common pins and glue, leaving one off at one end temporarily. On each end of the ladder is fastened a base, consisting of a block of wood, 4 in. square and 1 in. thick. As will be noted, the end of the ladder sides are set in inclined slots cut in the base blocks, glued, and fastened with round-headed brass screws. When joined to the bases, the ladder is not exactly vertical, but inclines 1 in. for every 10 in. of its length. The ladder can be made in any length desired; there is no need to stick to the 24-in. size of the original, but, in case it is made longer, the bases must be made longer also, so as to keep the toy stable. For a very long ladder, it would be best to fit one base and leave the upper end of the ladder open, but this means that the figure must be lifted from the bottom to the top every time



Here Is "Tumbling Teddy,"
an Acrobatic Clown That Will Amuse
the Youngsters for Hours at a Time



Details of the Figure of Teddy; the Holes and the Slots Must Be Exactly in the Center of the Clown

it tumbles down, while with a base at each end the whole ladder is simply reversed, and Teddy then tumbles to the other end of the ladder.

The figure of Teddy is $3\frac{1}{8}$ in. long, from the tip of the upraised hands to the bottom of the "feet." The figure is cut out of $\frac{3}{4}$ in. stock, preferably with a scrollsaw, as mentioned previously. The exact width of the figure is not so important, but in the original the width at the widest part, on a line across the shoulders, is 1 in., at the waist $\frac{5}{8}$ in. and the hips $\frac{7}{8}$ in. Exactly in the center of the thickness of the figure, and $\frac{3}{4}$ in. from the ends, two $\frac{3}{8}$ -in. holes are drilled through, and $\frac{5}{32}$ -in. slots cut from these to the ends. It is important that the holes and slots be exactly in the center of the figure, else Teddy will not perform properly. The inner edges of the slots are rounded off as indicated in the detail drawing. When finished, the figure is placed on the ladder at the place where the rung was left off, and this rung then pinned and glued in.

Now, if the ladder is placed up-right, with the figure at the top, Teddy will gracefully tumble down the ladder to the bottom, when the whole toy is reversed and the operation repeated. It may sometimes be found necessary to trim a little from the sides of the slots so that the figure can swing freely, and tumble down without a stop from top to bottom, but a little experiment will soon put it in first-class shape. The toy, of course, may be decorated in any manner desired.

Making Bicycle Tires Unleakable

Any bicycle tire that has a few small holes in it and is not worn down much, can be repaired easily so that it can be used until the rubber wears through. The tire is taken from the wheel and a small slit, about 6 or 8 in. long, is cut in it in the inside edge, as indicated. Next a supply of corks, a little smaller than the diameter of the tire, is procured. Corks cost almost nothing, so enough of

them can be bought for a few cents. The slit is pulled open and the corks are inserted into the tire, care being taken to keep them straight. They can be pushed entirely around the tire with a piece of rubber hose so as to make them fit tight. After the tire is completely filled with corks, the section of the tire where the slit was cut can be tightly taped to keep the tire intact. The tire is then replaced and glued with rubber cement. This repair will be found very good.—Wilson G. Walters, Rochester, N. Y.



Compressed Air Cleaning Away Mush Ice

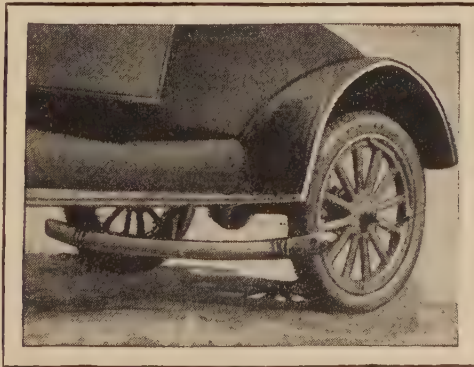
The successful winter operation of a hydroelectric plant was menaced by the entrance of mush ice into the penstock. This plant incurred considerable expense by the building of a series of screens designed to keep the ice out. But the ice continued to form and choked the screens. These were discarded in favor of a steam line to melt the ice before it could enter. This method also proved unsatisfactory. A visitor at the plant suggested the use of compressed air. A very small compressor was installed and the air piped to a point below the intake where, when released, the air would bubble up to the surface of the water. The thousands of little bubbles kept the entering water in such turmoil that ice could not form over it.—Sherwood J. Gee, Montpelier, Idaho.

Sharpening the Razor

Take a clean, bright piece of $\frac{1}{2}$ -in. lead pipe and rub it over the razor strop a few times. Then strop your razor, and you will find how quickly it will be sharpened. I have been doing this for 15 years and have never found it necessary to hone my razor.—H. A. Barwick, Montreal, Can.

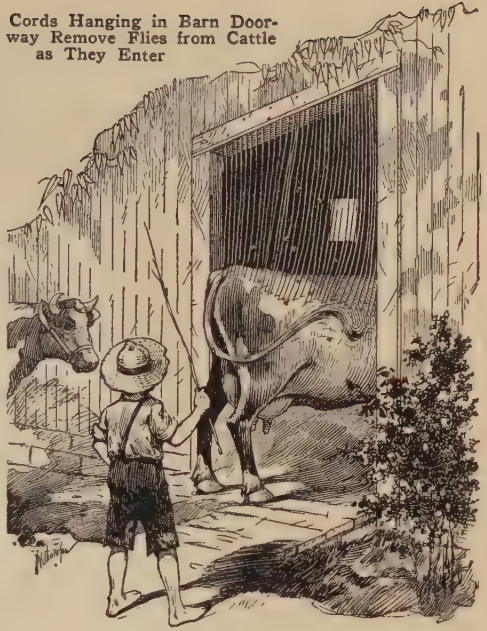
Fence Post Pulls Auto Out of Mud Hole

Due to the differential action of the rear wheels of an automobile it is often a difficult job to get out of a mud hole, as most drivers have experienced. However, by fastening a fence post, or any post of suitable size, to the rear wheels, as illustrated, it is a comparatively easy job to get out of the mud. The post should be tied to the wheels under the driveshaft and removed when it reaches the back of the fenders.—Art. Hellberg, McGregor, Iowa.



Get Your Car Out of a Mud Hole with the Aid of a Fence Post

Cords Hanging in Barn Doorway Remove Flies from Cattle as They Enter



Barn-Door Fly Chaser

Observing that most of the flies that troubled his cows at milking time were carried into the barn from the pastures by the animals themselves, a Wisconsin farmer made the fly chaser shown in the illustration, and reduced the annoyance to a great extent. Across the door from the yard to the barn a bar was placed at a height of 7 ft. and from this was suspended a curtain of twine strands, which hung to within $2\frac{1}{2}$ ft. of the ground. As the cows entered the barn through this door, in single file, the curtain brushed across their backs and sides and dislodged the flies, allowing the animals to enter the barn practically free from them. By keeping the interior of the barn darkened the milking then could proceed without much trouble.

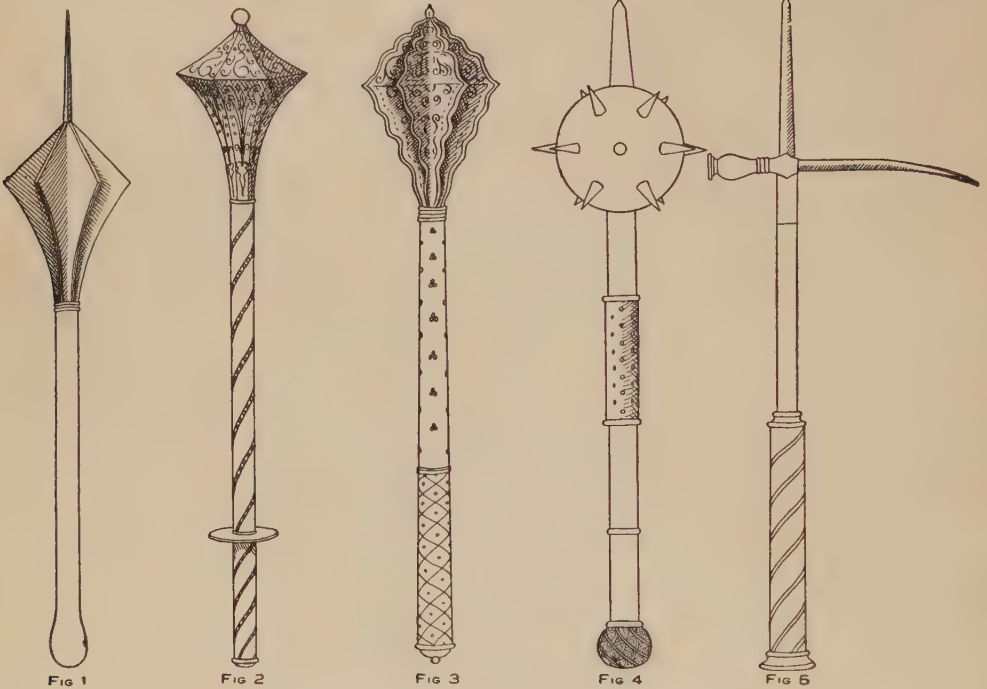
☛Mirrors and picture glasses should be cleaned with a pad of tissue paper sprinkled with methylated spirits.

Imitation Arms and Armor

PART III

Maces and battle-axes patterned after and made in imitation of the ancient weapons which were used from the

are somewhat difficult to make. After the glue is dry, remove all the surplus that has been pressed out from the joints



Ancient Weapons

fourteenth to the sixteenth century produce fine ornaments for the hall or den, says the English Mechanic. The imitation articles are made of wood, the steel parts represented by tinfoil stuck on with glue and the ornaments carved out with a carving tool.

An English mace used about the middle of the fifteenth century is shown in Fig. 1. The entire length of this weapon is about 24 in.; the handle is round with a four-sided sharp spike extending out from the points of six triangular shaped wings. Cut the handle and spike from one piece of wood and glue the wings on at equal distances apart around the base of the spike. The two bands or wings can be made by gluing two pieces of rope around the handle and fastening it with tacks. These rings can be carved out, but they

with the point of a sharp knife blade and then sandpaper the surface of the wood to make it smooth. Secure some tinfoil to cover the parts in imitation of steel. A thin coat of glue is quickly applied to the surface of the wood and the tinfoil laid on evenly so there will be no wrinkles and without making any more seams than is necessary. The entire weapon, handle and all, is to appear as steel.

An engraved iron mace of the fifteenth century is shown in Fig. 2. This weapon is about 22 in. long, mounted with an eight-sided or octagonal head. It will be easier to make this mace in three pieces, the octagonal head in one piece and the handle in two parts, so that the circular shield shown at the lower end of the handle can be easily placed between the parts. The circu-

lar piece or shield can be cut from a piece of wood about $\frac{1}{4}$ in. thick. The circle is marked out with a compass. A hole is made through the center for the dowel of the two handle parts when they are put together. A wood peg about 2 in. long serves as the dowel. A hole is bored in the end of both handle pieces and these holes well coated with glue, the wood peg inserted in one of them, the shield put on in place and handle parts put together and left for the glue to set. The head is fastened on the end of the handle with a dowel in the same manner as putting the handle parts together.

The head must have a pattern sketched upon each side in pencil marks, such as ornamental scrolls, leaves, flowers, etc. These ornaments must be carved out to a depth of about $\frac{1}{4}$ in. with a sharp carving tool. If such a tool is not at hand, or the amateur cannot use it well, an excellent substitute will be found in using a sharp-pointed and red-hot poker, or pieces of heavy wire heated to burn out the pattern to the desired depth. The handle also has a scroll to be engraved. When the whole is finished and cleaned

and firmly pressed into the engraved parts with the finger tips or thumb.

A French mace used in the sixteenth century is shown in Fig. 3. This weapon is about 22 in. long and has a wood handle covered with dark red cloth or velvet, the lower part to have a gold or red silk cord wound around it, as shown, the whole handle finished off with small brass-headed nails. The top has six ornamental carved wings which are cut out, fastened on the handle and covered with tinfoil, as described in Fig. 2.

Figure 4 shows a Morning Star which is about 26 in. long. The spiked ball and the four-sided and sharp-pointed spike are of steel. The ball may be made of clay or wood and covered with tinfoil. The spikes are cut out of wood, sharp-pointed and cone-shaped, the base having a brad to stick into the ball. The wood spikes are also covered with tinfoil. The handle is of steel imitation, covered in the middle with red cloth or velvet and studded with large-headed steel nails.

A war hammer of the fifteenth century is shown in Fig. 5. Its length is about 3 ft. The lower half of the handle is wood, covered with red vel-

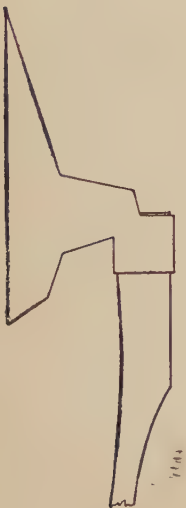


FIG. 6



FIG. 7

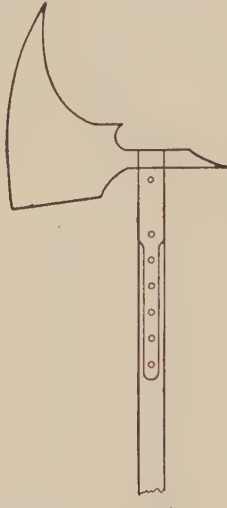


FIG. 8

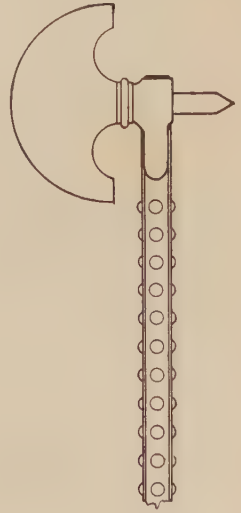


FIG. 9

Battle Axes of the Fourteenth, Fifteenth and Sixteenth Centuries

up, it is covered with tinfoil in imitation of steel. The tinfoil should be applied carefully, as before mentioned,

vet, with a golden or yellow cord wound spirally over the cloth. The upper half of the handle is steel, also,

the hammer and spike. The entire handle should be made of one piece, then the hammer put on the base of the spike. The spike made with a peg in its lower end and well glued, can be firmly placed in position by the peg fitting in a hole made for its reception in the top of the handle. Finish up the steel parts with tinfoil.

The following described weapons can be constructed of the same materials and built up in the same way as described in the foregoing articles: A horseman's short-handled battle-axe, used at the end of the fifteenth century, is shown in Fig. 6. The handle is of wood and the axe in imitation steel. Figure 7 shows an English horseman's battle-axe used at the beginning of the reign of Queen Elizabeth. The handle and axe both are to be shown in steel. A German foot soldier's poleaxe used at the end of the fourteenth century is shown in Fig. 8. The handle is made of dark wood and the axe covered with tinfoil. Figure 9 shows an English foot soldier's jedburgh axe of the sixteenth century. The handle is of wood, studded with large brass or steel nails. The axe is shown in steel. All of these axes are about the same length.

Playing Baseball with a Pocket Knife

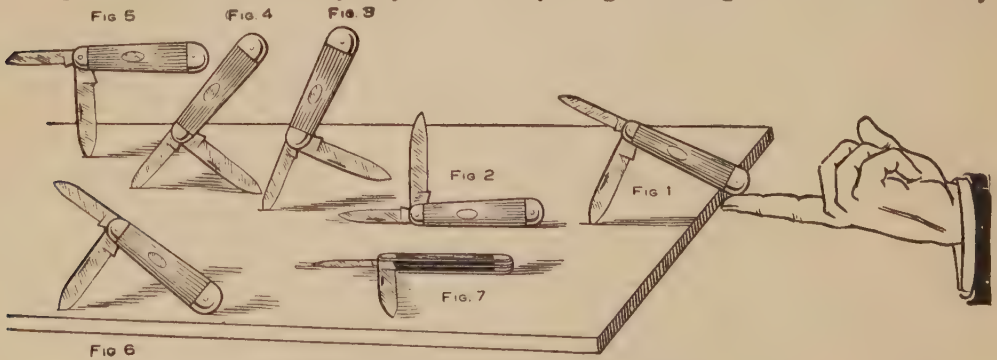
An interesting game of baseball can be played by two persons with a common pocket knife on a rainy day or in

upward movement of the forefinger it is thrown into the air to fall and land in one of the positions shown. The plays are determined by the position of the knife after the fall.

A foul ball is indicated by Fig. 2, the knife resting on its back. The small blade sticking in the board which holds the handle in an upright position, as shown in Fig. 3, calls for a home run. Both blades sticking in the board (Fig. 4), a three-base hit. A two-base hit is made when the large blade sticks in the board, Fig. 5. A one-base hit is secured when the large blade and the end of the handle touch the board as in Fig. 6. The knife falling on its side (Fig. 7) calls for one out. Each person plays until three outs have been made, then the other plays, and so on for nine innings.—Contributed by Herbert Hahn, Chicago.

How to Remove Paper Stuck to a Negative

When making photographic prints from a negative, sometimes a drop of moisture will cause the print to stick to the gelatine film on the glass. Remove as much of the paper as can be readily torn off and soak the negative in a fresh hypo bath of 3 or 4 oz. hypo to 1 pt. of water for an hour or two. Then a little gentle rubbing with the finger—not the finger nail—will remove anything adhering to the film. It may



Positions of the Knife Indicate the Plays

the winter time when the regular game cannot be played outdoors. The knife is opened and loosely stuck into a board, as in Fig. 1, and with a quick

be found that the negative is not colored. If it is spotted at all, the negative must be washed for a few minutes and placed in a combined toning and

fixing bath, which will remove the spots in a couple of hours. The negative must be well washed after going through the solutions to take away any trace of hypo.

Old-Time Magic

A Sack Trick

The magician appears accompanied by his assistant. He has a sack similar to a meal bag only on a large scale. The upper end of this bag is shown in Fig. 1, with the rope laced in the cloth. He then selects several people from the audience as a committee to examine the sack to see that there is absolutely no deception whatever in its makeup. When they are satisfied that the bag or sack is all right, the magician places his assistant inside and drawing the bag around him he allows the committee to tie him up with as many knots as they choose to make, as shown in Fig. 2.

The bag with its occupant is placed in a small cabinet which the committee surround to see that there is no outside help. The magician then takes his watch and shows the audience that in less than 30 seconds his assistant will emerge from the cabinet with the sack in his hand. This he does, the sack is again examined and found to be the same as when it was first seen.

The solution is when the assistant enters the bag he pulls in about 15 in. of the rope and holds it, as shown in Fig. 3, while the committee is tying him up. As soon as he is in the cabinet he merely lets out the slack thus making enough room for his body to pass through. When he is out of the bag he quickly unties the knots and then steps from his cabinet.—Contributed by J. F. Campbell, Somerville, Mass.

The Invisible Light

The magician places two common wax candles on a table, one of them burning brightly, the other without a light. Members of the audience are allowed to inspect both the table and the candles.

The magician walks over to the burning candle, shades the light for a few

seconds, turns to the audience with his hands a few inches apart, showing that there is nothing between them, at the



Sack Trick—Holding the Rope Inside the Bag

same time saying that he has a light between his hands, invisible to them (the audience), with which he is going to light the other candle. He then walks over to the other candle, and, in plain sight of the audience lights the candle apparently with nothing.

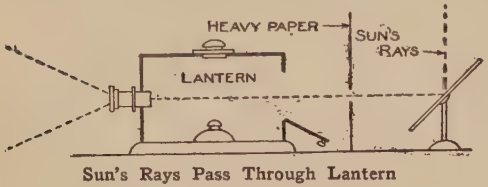
In reality the magician has a very fine wire in his hand which he is heating while he bends over the lighted candle, and the audience gaze on and see nothing. He turns to the other candle and touches a grain of phosphorus that has been previously concealed in the wick with the heated wire, thus causing it to light.—Contributed by C. Brown, New York City.

Using the Sun's Light in a Magic Lantern

The light furnished with a small magic lantern does very well for evening exhibitions, but the lantern can be used in the daytime with good results by directing sunlight through the lens instead of using the oil lamp.

A window facing the sun is selected

and the shade is drawn almost down, the remaining space being covered by a piece of heavy paper. A small hole is

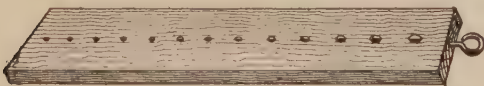


cut in the paper and the lantern placed on a table in front of the hole, the lamp having been removed and the back opened. The lantern must be arranged so that the lens will be on a horizontal line with the hole in the paper. A mirror is then placed just outside of the window and at such an angle that the beam of light is thrown through the hole in the paper and the lens of the lantern.

The shades of the remaining windows are then drawn and the lantern is operated in the usual way.—Contributed by L. B. Evans, Lebanon, Ky.

A Handy Drill Gauge

The accompanying sketch shows a simple drill gauge which will be found very handy for amateurs. The gauge consists of a piece of hard wood, $\frac{3}{4}$ in. thick, with a width and length that will be suitable for the size and number of drills you have on hand. Drill a hole through the wood with each drill you have and place a screweye in one end to be used as a hanger. When you want to drill a hole for a pipe, bolt,



Drill Gauge

screw, etc., you take the gauge and find what size drill must be used in drilling the hole.—Contributed by Andrew G. Thome, Louisville, Ky.

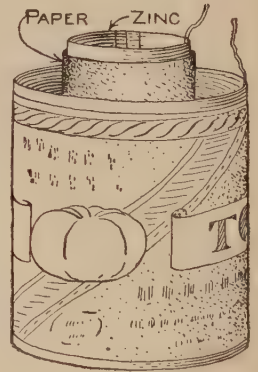
A good stove polish can be made by mixing together 1 lb. of plumbago, 4 oz. of turpentine, 4 oz. of water and 1 oz. of sugar. Mix well and apply with a cloth or brush.

A Home-Made Daniell Cell

An effective Daniell galvanic cell may be constructed from material costing very little money. A common tin tomato can with a copper wire soldered to the top forms the jar and positive electrode. A piece of discarded stove zinc rolled into an open cylinder of about $1\frac{1}{2}$ -in. diameter, 5 in. long, with a copper wire soldered at one end forms the negative electrode.

To make the porous cell, roll a piece of heavy brown wrapping paper, or blotting paper, into a tube of several thicknesses, about 5 in. long with an internal diameter of 2 in. Tie the paper firmly to prevent unrolling and close up one end with plaster of paris $\frac{1}{2}$ in. thick. It is well to slightly choke the tube to better retain the plaster. The paper used must be unsized so that the solutions can mingle through the pores.

Two liquids are necessary for the cell. Make a strong solution in a glass or wooden vessel of blue vitriol in water. Dilute some oil of vitriol (sulphuric acid) with about 12 times its measure of water and keep in a bottle when not in use. In making up the solution, add the acid to the water with constant stirring. *Do not add water to the acid.*



The cell is charged by placing the zinc in the paper tube and both placed into the tin can. Connect the two wires and pour the dilute acid into the porous cell around the zinc, and then immediately turn the blue vitriol solution into the can outside the paper cup.

A current generates at once and metallic copper begins to deposit on the inside of the can. It is best to let the action continue for a half hour or so before putting the cell into use.

Several hours working will be required before the film of copper becomes sufficiently thick to protect the tin from corrosion when the cell stands idle. For this reason it will be necessary to pour out the blue vitriol solution into another receptacle immediately after through using, as otherwise the tin would be soon eaten full of holes. The porous cup should always be emptied after using to prevent the diffusion of the blue vitriol solution into the cup, and the paper tube must be well rinsed before putting away to dry.

This makes one of the most satisfactory battery cells on account of the constancy of its current, running for hours at a time without materially losing strength, and the low cost of maintenance makes it especially adapted for amateurs' use. Its current strength is about one volt, but can be made up into any required voltage in series. A battery of a dozen cells should cost not to exceed 50 cts. for the material, which will give a strong, steady current, amply sufficient for all ordinary experimental work.

A strong solution of common salt may be used in place of the oil of vitriol in the porous cup, but is not so good.—Contributed by C. H. Denniston, Pulteney, N. Y.

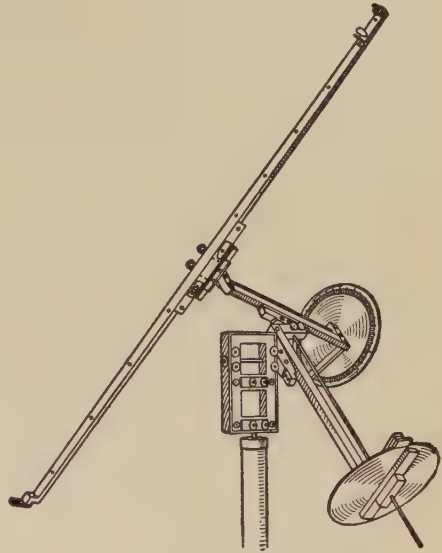
A Home-Made Equatorial

By Harry Clark

The ordinary equatorial is designed and built for the latitude of the observatory where it is to be used. This is necessary since the hour axis must point to the north pole of the heavens whose elevation above the horizon is equal to the latitude of the observer's station. The final adjustment of an ordinary equatorial is very tedious so that when once set up it is not to be moved. This calls for a suitable house to protect the instrument. It has been the aim of the writer to build a very simple instrument for amateur work which would be adjustable to any latitude, so easily set up ready for work and so portable that it need not be left

out of doors from one evening until the next.

The instrument is mounted on a tripod or piece of iron pipe carrying a



Instrument for Locating Stars

short vertical rod of $\frac{3}{8}$ -in. steel. A rectangular wooden frame with suitable bearings rotates about this shaft. The frame has also two horizontal bearings carrying a short shaft to the end of which the frame carrying the hour axis is firmly clamped. By this arrangement of two perpendicular shafts the hour axis may be directed to any point in the heavens without care as to how the tripod or pipe is set up.

The frame for the hour axis is about 12 in. long with a bearing at each end. The shaft which it carries is $\frac{1}{4}$ -in. steel, carrying the hour circle at one end, and at the other the frame for the declination axis which is similar to the other, but somewhat lighter. The declination axis is also of $\frac{1}{4}$ -in. steel, carrying at one end the declination circle and the pointer at the other.

The entire frame of the instrument is made of cherry and it will save the builder much time if he will purchase cherry "furniture" which is used by printers and can be obtained from any printers' supply company. It is best quality wood free from imperfections in straight strips one yard long and of a

uniform width of about $\frac{5}{8}$ in. As to thickness, any multiple of 12-point (about $\frac{1}{8}$ in.) may be obtained, thus saving much work in fitting up joints. Fifty cents will buy enough wood for an entire instrument. All corners are carefully mortised and braced with small brass angle-pieces. The frame is held together by small brass machine screws. After much experimentation with bearings, it was found best to make them in halves as metal bearings are usually made. The loose half is held in place by guides on all four sides and is tightened by two screws with milled nuts. A great deal of trouble was experienced in boring out the bearings until the following method was devised. One hole was bored as well as possible. The bearing was then loosened and a bit run through it to bore the other. Finally, a piece of shafting was roughened by rolling it on a file; placed in both bearings and turned with a brace. The bearings were gradually tightened until perfectly ground.

The declination axis must be perpendicular to both the hour axis and the line of sight over the pointer. To insure this, a positive adjustment was provided. The end of the shaft is clamped in a short block of wood by means of a bearing like the ones described. One end of the block is hinged to the axis frame, while the other end is attached by two screws, one drawing them together, the other holding them apart. The axis is adjusted by turning these screws. Each shaft, save the one in the pipe, is provided with this adjustment.

The pointer is of two very thin strips placed at right angles and tapered slightly at each end. The clamp is attached as shown in the illustration. The eye piece is a black iron washer supported on a small strip of wood. The aperture should be $\frac{1}{4}$ in., since the pupil of the eye dilates very much in darkness. The error due to large aperture is reduced by using a very long pointer which also makes it possible to focus the eye upon the front sight and the star simultaneously. The

forward sight is a bright brass peg illuminated by a tiny electric lamp with a reflector to shield the eye. The pointer arranged in this way is a great improvement over the hollow tube sometimes used, since it allows an unobstructed view of the heavens while indicating the exact point in question.

The circles of the instrument are of aluminum, attached to the shafts by means of wooden clamps. They were nicely graduated by a home-made dividing engine of very simple construction, and the figures were engraved with a pantograph. The reading is indicated by a cut on a small aluminum plate attached to a pointer. The hour circle is divided into 24 parts and subdivided to every four minutes. The figures are arranged so that when the instrument is set up, the number of hours increases while the pointer travels oppositely to the stars. The declination circle is graduated from zero to 90 deg. in each direction from two points 180 deg. apart. It is adjusted to read zero when the pointer and two axes are mutually perpendicular as shown in the picture.

To adjust the instrument it is set up on the iron pipe and the pointer directed to some distant object. All set screws, excepting those on the declination axis, are tightened. Then the pointer is carefully turned through 180 deg. and if it is not again directed to the same point, it is not perpendicular to the declination axis. When properly set it will describe a great circle. With the declination axis in an approximately horizontal position the place where the pointer cuts the horizon is noted. The declination axis is then turned through 180 deg., when the pointer should again cut at the same place. Proper adjustment will cause it to do so. It is desirable that the hour circle should read approximately zero when the declination axis is horizontal, but this is not necessary for a reason soon to be explained. All these adjustments, once carefully made, need not be changed.

In using the instrument the hour axis can be directed to the north pole

by the following method. Point it approximately to the north star. The pole is 1 deg. and 15 min. from the star on a straight line from the star to "Mizar," the star at the bend of the handle in the Big Dipper. Turn the hour circle into a position where the pointer can describe a circle through "Mizar." Only a rough setting is necessary. Now turn the pointer so that a reading of 88 deg. 45 min. shows on the declination circle on that side of 90 which is toward "Mizar." When this is done, clamp both axes and turn the shafts in the base until the pointer is directed accurately to the north star. It is evident from a study of the picture that the position of the small pointer which indicates the reading on the hour circle is not independent of the way in which the tripod or pipe is set up. It would then be useless to adjust it carefully to zero when the pointer cuts the "zenith" as is done with a

large equatorial. Instead, the adjustment is made by setting the clock or watch which is part of the outfit. The pointer is directed to Alpha, Cassiopeiæ, and the hour reading subtracted from 24 hours (the approximate right ascension of the star) gives the time which the clock should be set to indicate. All of these settings should require not more than five minutes.

To find a star in the heavens, look up its declination and right ascension in an atlas. Set the declination circle to its reading. Subtract the clock time from the right ascension (plus 24 if necessary) and set the hour circle to the result. The star will then be seen on the tip of the pointer.

To locate a known star on the map, turn the pointer to the star. Declination is read directly. Add the clock time to the hour reading to get right ascension. If the result is more than 24 hours, subtract 24.

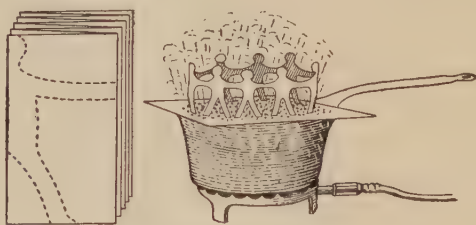
A Ground Glass Substitute

Ordinary plain glass coated with the following mixture will make a good ground glass substitute: Dissolve 18 gr. of gum sandarac and 4 gr. of gum mastic in $3\frac{1}{2}$ dr. of ether, then add 12-3 dr. benzole. If this will be too transparent, add a little more benzole, taking care not to add too much. Cover one side of a clear glass and after drying it will produce a perfect surface for use as a ground glass in cameras.—Contributed by Ray E. Strosnider, Plain City, Ohio.

A Miniature War Dance

A piece of paper, 3 or 4 in. long, is folded several times, as shown in the sketch, and the first fold marked out to represent one-half of an Indian. Cut out all the folds at one time on the dotted line and you will have as many men joined together as there were folds in the paper. Join the hands of the two end men with a little paste so as to form a circle of Indians holding hands.

The next thing to do is to punch holes in heavy cardboard that is large enough to cover a pot or stew pan, and



Indian War Dance

partially fill the vessel with water. Set this covered vessel over a heat and bring the water to a boiling point and then set the miniature Indians on the perforated cover. The dance will begin.

If the Indians are decked out with small feathers to represent the head gear and trailing plumes, a great effect will be produced.—Contributed by Maurice Baudier, New Orleans, La.

Turning the water on before starting the gas engine may prevent breaking a cylinder on a cold day.

OLD-TIME MAGIC

Removing 36 Cannon Balls from a Handbag

The magician produces a small handbag and informs the audience that he has it filled with 20-lb. cannon balls. He opens up the bag and takes out a ball which he passes to the audience

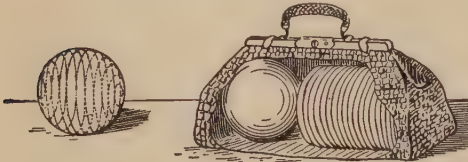


Fig. 1

Fig. 2

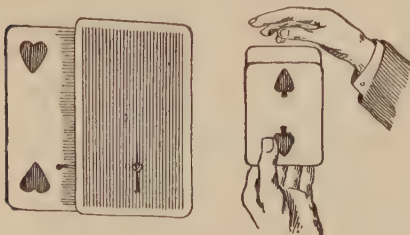
Balls Made of Spring Wire

for examination. The ball is found to be the genuine article. He makes a few passes with the wand and produces another ball, and so on until 36 of them lie on the floor.

In reality the first ball, which is the one examined, is the real cannon ball, the others are spiral-spherical springs covered with black cloth (Fig. 1). These balls can be pressed together in flat disks and put in the bag, Fig. 2, without taking up any great amount of space. When the spring is released it will fill out the black cloth to represent a cannon ball that cannot be distinguished from the real article.—Contributed by J. F. Campbell, Somerville, Mass.

A Rising Card Trick

A rising card trick can be accomplished with very little skill by using the simple device illustrated. The only



Card Slips from the Pack

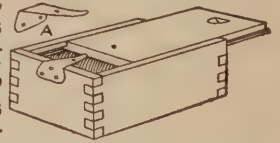
things needed are four ordinary playing cards and a short rubber band.

Pass one end of the rubber band through one card and the other end through the other card, as shown in the illustration, drawing the cards close together and fastening the ends by putting a pin through them. The remaining two cards are pasted to the first two so as to conceal the pins and ends of the rubber band.

Put the cards with the rubber band in a pack of cards; take any other card from the pack and show it to the audience in such a way that you do not see and know the card shown. Return the card to the pack, but be sure and place it between the cards tied together with the rubber band. Grasp the pack between your thumb and finger tightly at first, and by gradually loosening your hold the card previously shown to the audience will slowly rise out of the pack.—Contributed by Tomi O'Kawara, San Francisco, Cal.

Sliding Box Cover Fastener

While traveling through the country as a watchmaker I found it quite convenient to keep my small drills, taps, small brooches, etc., in boxes having a sliding cover. To keep the contents



from spilling or getting mixed in my case I used a small fastener as shown in the accompanying illustration. The fastener is made of steel or brass and fastened by means of small screws or tacks on the outside of the box. A hole is drilled on the upper part to receive the pin that is driven into the sliding cover. This pin should not stick out beyond the thickness of the spring, which is bent up at the point so the pin will freely pass under it. The pin can be driven through the cover to prevent it from being pulled entirely out of the box.—Contributed by Herm Grabemann, Milwaukee, Wis.

How to Chain a Dog

A good way to chain a dog and give him plenty of ground for exercise is to stretch a clothesline or a galvanized

collar is fastened to the ring. This method can also be used for tethering a cow or horse, the advantage being



The Dog Has Plenty of Room for Exercise

wire between the house and barn on which is placed a ring large enough to slide freely. The chain from the dog's

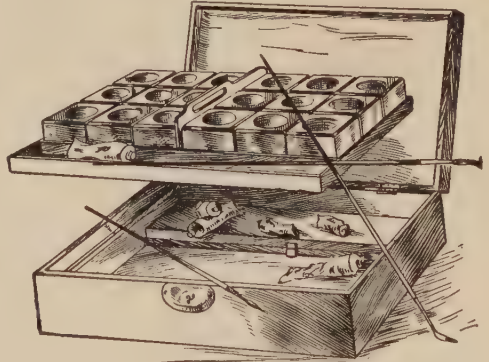
the use of a short tie rope eliminating the possibility of the animal becoming entangled.

Water-Color Box

There are many different trays in the market for the purpose of holding water colors, but they are either too expensive for the average person or too small to be convenient. I do a great deal of water-color work and always felt the need of a suitable color dish. At last I found something that filled my want and suited my pocket-book. I bought 22 individual salt dishes and made a box to hold them, as shown in the illustration. This box has done good service.

Some of the advantages are: Each color is in a separate dish which can be easily taken out and cleaned; the dishes are deep enough to prevent spilling the colors into the adjoining ones, and the box can be made as big or as small as individual needs require. The tray containing the color dishes and brushes rests on $\frac{1}{4}$ -in. round pieces $2\frac{1}{4}$ in. from the bottom of the box,

thus giving ample store room for colors, prints, slides and extra brushes.



Color Trays Made of Salt Dishes

—Contributed by B. Beller, Hartford, Connecticut.

☞ Ink usually corrodes pens in a short time. This can be prevented by placing pieces of steel pens or steel wire in the ink, which will absorb the acid and prevent it from corroding the pens.

A Plant-Food Percolator

Obtain two butter tubs and bore a large number of $\frac{1}{4}$ -in. holes in the bottom of one, then cover the perforated part

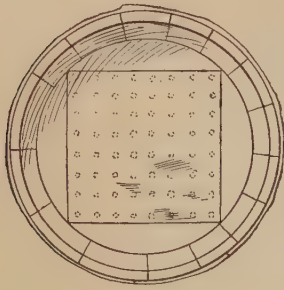


Fig. 1

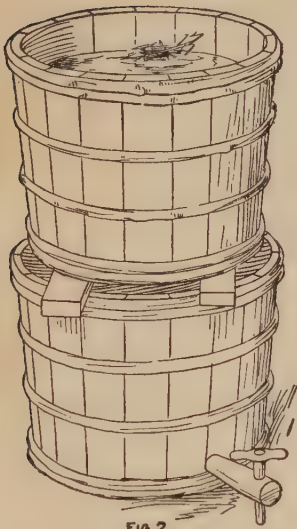


Fig. 2

with a piece of fine brass gauze (Fig. 1), tacking the gauze well at the corners. The other tub should be fitted with a faucet of some kind—a wood faucet, costing 5 cents, will answer the purpose. Put the first tub on top of the other with two narrow strips between them (Fig. 2). Fill the upper tub, about three-fourths full, with well packed horse manure, and pour water on it until it is well soaked. When the water has percolated through into the lower tub, it is ready to use on house and garden plants and is better than plain water, as it adds both fertilizer and moisture.—Contributed by C. O. Darke, West Lynn, Mass.

☞ Always caliper the work in a lathe while it is standing still.

☞ Never use the ways of a lathe for an anvil or storage platform.

Folding Quilting-Frames

The frame in which the material is kept stretched when making a quilt is usually too large to be put out of the way conveniently when other duties must be attended to; and especially are the end pieces objectionable. This can be remedied by hinging the ends so they will fold underneath to the center. The end pieces are cut in two at one-fourth their distance from each end, a hinge screwed to the under side to hold them together, and a hook and eye fastened on the other side to hold the parts rigid when they are in use. When the ends are turned under, the frame is narrow enough to be easily carried from one room to another, or placed against a wall.

A Drip Shield for the Arms

When working with the hands in a pan of water, oil or other fluid, it is very disagreeable to have the liquid run down the arms, when they are raised from the pan, often to soil the sleeves of a clean garment. A drip shield which will stop the fluid and cause it to run back into the pan can be easily made from a piece of sheet rubber or, if this is not available, from a piece of the inner tube of a bicycle tire. Cut a washer with the hole large enough to fit snugly about the wrist, but not so tight as to stop the circula-



Shields for the Arms

tion of the blood. A pair of these shields will always come in handy.—Contributed by L. M. Eifel, Chicago.

How to Cane Chairs

There are but few households that do not have at least one or two chairs without a seat or back. The same households may have some one who would enjoy recaning the chairs if he only knew how to do it, and also make considerable pin money by repairing chairs for the neighbors. If the following directions are carried out, new cane seats and backs can easily be put in chairs where they are broken or sagged to an uncomfortable position.

The first thing necessary is to remove the old cane. This can be done by turning the chair upside down and, with the aid of a sharp knife or chisel, cutting the cane between the holes. After this is done the old bottom can be pulled out. If plugs are found in any of the holes, they should be knocked out. If the beginner is in doubt about finding which holes along any curved sides should be used for the cane running nearly parallel to the edge, he may find it to his advantage to mark the holes on the under side of the frame before removing the old cane.

The worker should be provided with a small sample of the old cane. At any first-class hardware store a bundle of similar material may be secured.

The cane usually comes in lengths of about 15 ft. and each bundle contains

rind, a square pointed wedge, as shown in Fig. 1, and 8 or 10 round wood plugs, which are used for temporarily holding the ends of the cane in the holes.



Fig. 1

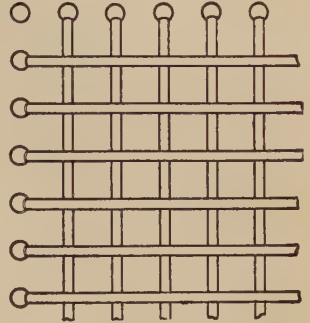


Fig. 2

First Layer of Strands

A bucket of water should be supplied in which to soak the cane just before weaving it. Several minutes before you are ready to begin work, take four or five strands of the cane, and, after having doubled them up singly into convenient lengths and tied each one into a single knot, put them into the water to soak. The cane is much more pliable and is less liable to crack in bending when worked while wet. As fast as the soaked cane is used, more of it should be put into the water.

Untie one of the strands which has

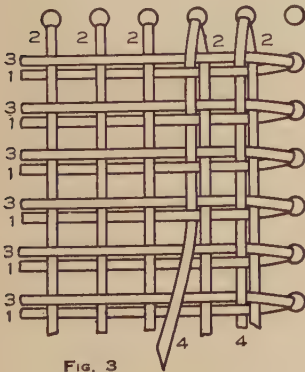


Fig. 3

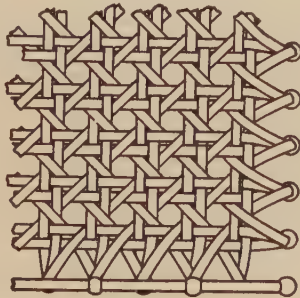


Fig. 5

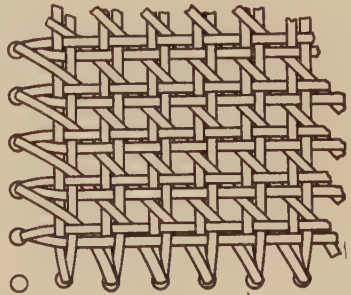


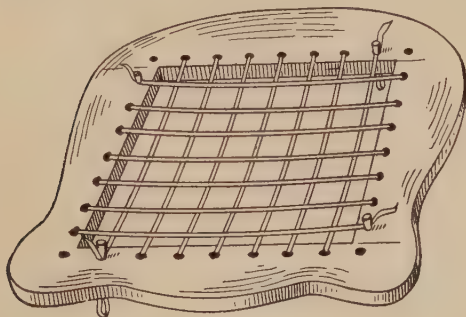
Fig. 4

Three Stages of Weaving

enough to reseat several chairs. In addition to the cane, the worker should provide himself with a piece of bacon

been well soaked, put about 3 or 4 in. down through the hole at one end of what is to be the outside strand of

one side and secure it in this hole by means of one of the small plugs mentioned. The plug should not be forced in too hard nor cut off, as it must be re-



First Two Layers in Place

moved again. The other end of the strand should be made pointed and passed down through the hole at the opposite side, and, after having been pulled tight, held there by inserting another plug. Pass the end up through the next hole, then across and down, and hold while the second plug is moved to the last hole through which the cane was drawn. In the same manner proceed across the chair bottom. Whenever the end of one strand is reached, it should be held by a plug, and a new one started in the next hole as in the beginning. No plugs should be permanently removed until another strand of cane is through the same hole to hold the first strand in place. After laying the strands across the seat in one direction, put in another layer at right angles and lying entirely above the first layer. Both of these layers when in place appear as shown in one of the illustrations.

After completing the second layer, stretch the third one, using the same holes as for the first layer. This will make three layers, the first being hidden by the third while the second layer is at right angles to and between the first and third. No weaving has been done up to this time, nothing but stretching and threading the cane through the holes. The cane will have the appearance shown in Fig. 3. The next thing to do is to start the cane across in the same direction as the second layer and begin the weaving.

The top or third layer strands should be pushed toward the end from which the weaving starts, so that the strand being woven may be pushed down between the first and third layers and up again between pairs. The two first strands of the fourth layer are shown woven in Fig. 3. During the weaving, the strands should be lubricated with the rind of bacon to make them pass through with ease. Even with this lubrication, one can seldom weave more than half way across the seat with the pointed end before finding it advisable to pull the remainder of the strand through. After finishing this fourth layer of strands, it is quite probable that each strand will be about midway between its two neighbors instead of lying close to its mate as desired, and here is where the square and pointed wedge is used. The wedge is driven down between the proper strands to move them into place.

Start at one corner and weave diagonally, as shown in Fig. 4, making sure that the strand will slip in between the two which form the corner of the square in each case. One more weave across on the diagonal and the seat will be finished except for the binding, as shown in Fig. 5. The binding consists of one strand that covers the row of holes while it is held down with another strand, a loop over the first being made every second or third hole as desired. It will be of great assistance to keep another chair with a cane bottom at hand to examine while recaning the first chair.—Contributed by M. R. W.

Repairing a Cracked Composition Developing Tray

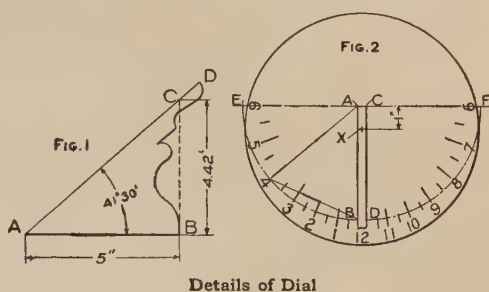
Fill the crack with some powdered rosin and heap it up on the outside. Heat a soldering-iron or any piece of metal enough to melt the rosin and let it flow through the break. When cool, trim off the surplus rosin. If handled with a little care, a tray repaired in this manner will last a long time. The chemicals will not affect the rosin.—Contributed by E. D. Patrick, Detroit, Michigan.

How to Lay Out a Sundial

The sundial is an instrument for measuring time by using the shadow of the sun. They were quite common in ancient times before clocks and watches were invented. At the present time they are used more as an ornamentation than as a means of measuring time, although they are quite accurate if properly constructed. There are several different designs of sundials, but the most common, and the one we shall describe in this article, is the horizontal dial. It consists of a flat circular table, placed firmly on a solid pedestal and having a triangular plate of metal, Fig. 1, called the gnomon, rising from its center and inclined toward the meridian line of the dial at an angle equal to the latitude of the place where the dial is to be used. The shadow of the edge of the triangular plate moves around the northern part of the dial from morning to afternoon, and thus supplies a rough measurement of the hour of the day.

The style or gnomon, as it always equals the latitude of the place, can be laid out as follows: Draw a line AB, Fig. 1, 5 in. long and at the one end erect a perpendicular BC, the height of which is taken from table No. 1. It may be necessary to interpolate for a given latitude, as for example, lat. $41^{\circ}30'$. From table No. 1 lat. 42° is 4.5 in. and for lat. 40° , the next smallest, it is 4.2 in. Their difference is .3 in. for 2° , and for 1° it would be .15 in. For $30'$ it would be $\frac{1}{2}$ of 1° or .075 in. All added to the lesser or 40° , we have $4.2 + .15 + .075$ in. = 4.42 in. as the height of the line BC for lat. $41^{\circ}30'$. If you have a table of natural functions, the height

of the line BC, or the style, is the base (5 in. in this case) times the tangent of the degree of latitude. Draw the line AD, and the angle BAD is the correct angle for the style for the given



latitude. Its thickness, if of metal, may be conveniently from $\frac{1}{8}$ to $\frac{1}{4}$ in.; or if of stone, an inch or two, or more, according to the size of the dial. Usually for neatness of appearance the back of the style is hollowed as shown. The upper edges which cast the shadows must be sharp and straight, and for this size dial (10 in. in diameter) they should be about $7\frac{1}{2}$ in. long.

To lay out the hour circle, draw two parallel lines AB and CD, Fig. 2, which will represent the base in length and thickness. Draw two semi-circles, using the points A and C as centers, with a radius of 5 in. The points of intersection with the lines AB and CD will be the 12-o'clock marks. A line EF drawn through the points A and C, and perpendicular to the base or style, and intersecting the semi-circles, gives the 6-o'clock points. The point marked X is to be used as the center of the dial. The intermediate hour and half-hour lines can be plotted by using table No. 2 for given lati-

TABLE NO. 1.
Height of stile in inches for a 5 in.
base, for various latitudes.

Latitude	Height	Latitude	Height
25°	233	42°	450
26°	244	44°	483
27°	255	46°	518
28°	266	48°	555
30°	289	50°	596
32°	312	52°	640
34°	337	54°	688
36°	363	56°	741
38°	391	58°	800
40°	420	60°	866

tudes, placing them to the right or left of the 12-o'clock points. For latitudes not given, interpolate in the same manner as for the height of the style. The

the correct time for longitude 75° New York, 90° Chicago, 105° Denver and 120° for San Francisco. Ascertain in degrees of longitude how far your dial

is east or west of the nearest standard meridian and divide this by 15, reducing the answer to minutes and seconds, which will be the correction in minutes and seconds of time. If the dial is east of the meridian chosen, then the watch is slower; if west, it will be faster. This correction can be added to the values in table No. 3, making each value slower when it is east of the standard meridian

TABLE No.2.
Chords in inches for a 10 in. circle Sundial

Latitude	HOURS OF DAY											
	12-30	1	1-30	2	2-30	3	3-30	4	4-30	5	5-30	
	11-30	11	10-30	10	9-30	9	8-30	8	7-30	7	6-30	
25°	.28	.56	.87	1.19	1.57	1.99	2.49	3.11	3.87	4.82	5.93	
30°	.33	.66	1.02	1.40	1.82	2.30	2.85	3.49	4.26	5.14	6.10	
35°	.38	.76	1.16	1.59	2.06	2.57	3.16	3.81	4.55	5.37	6.23	
40°	.42	.85	1.30	1.77	2.27	2.82	3.42	4.07	4.79	5.55	6.32	
45°	.46	.94	1.42	1.93	2.46	3.03	3.64	4.29	4.97	5.68	6.39	
50°	.50	1.01	1.53	2.06	2.68	3.21	3.82	4.46	5.12	5.79	6.46	
55°	.54	1.08	1.63	2.19	2.77	3.37	3.98	4.60	5.24	5.87	6.49	
60°	.57	1.14	1.71	2.30	2.89	3.49	4.10	4.72	5.34	5.93	6.52	

$\frac{1}{4}$ -hour and the 5 and 10-minute divisions may be spaced with the eye or they may be computed.

When placing the dial in position, care must be taken to get it perfectly level and have the style at right angles to the dial face, with its sloping side pointing to the North Pole. An ordinary compass, after allowing for the declination, will enable one to set the dial, or it may be set by placing it as near north and south as one may judge and comparing with a watch set at standard time. The dial time and the watch time should agree after the watch has been corrected for the equation of time from table No. 3, and for the difference between standard and local time, changing the position of the dial until an agreement is reached. Sun time and standard time agree only four times a year, April 16, June 15, Sept. 2 and Dec. 25, and on these dates the dial needs no correction. The corrections for the various days of the month can be taken from Table 3. The + means that the clock is faster, and the — means that the dial is faster than the sun. Still another correction must be made which is constant for each given locality. Standard time is

and faster when it is west.

The style or gnomon with its base can be made in cement and set on a cement pedestal which has sufficient base placed in the ground to make it solid.

The design of the sundial is left to the ingenuity of the maker.—Contributed by J. E. Mitchell, Sioux City, Iowa.

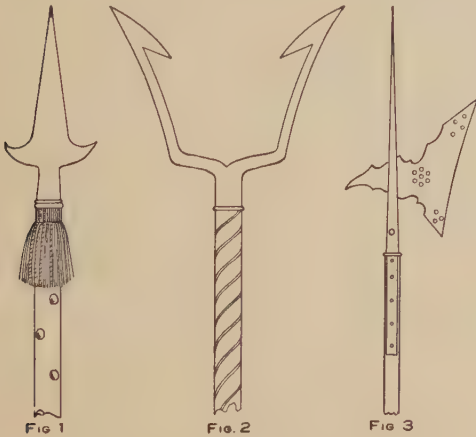
TABLE No.3
Corrections in minutes to change
Sun time to local mean time,— add
those marked +, subtract those
marked —, from Sundial time.

Day of month	1	10	20	30
January	+3	+7	+11	+13
February	+14	+14	+14	
March	+13	+11	+8	+5
April	+4	+2	—1	—3
May	—3	—4	—4	—3
June	—3	—1	+1	+3
July	+3	+5	+6	+6
August	+6	+5	+3	+1
September	+0	—3	—6	—10
October	—10	—13	—15	—16
November	—16	—16	—14	—11
December	—11	—7	—3	+2

Imitation Arms and Armor—Part IV

The ancient arms of defense as shown in the accompanying illustrations make good ornaments for the den if they are cut from wood and finished in imitation of the real weapon. The designs shown represent original arms of the sixteenth and seventeenth centuries. As they are the genuine reproductions, each article can be labelled with the name, adding to each piece interest and value, says the *English Mechanic*, London.

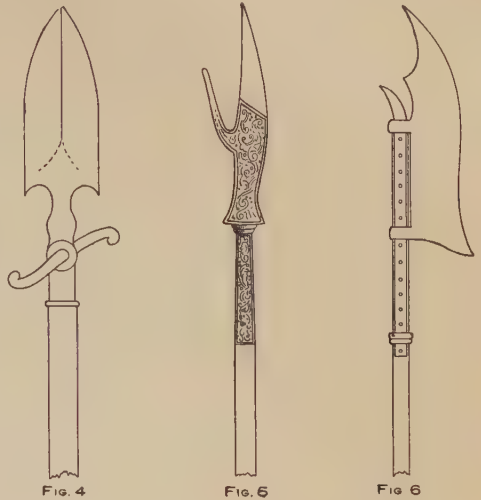
Each weapon is cut from wood. The blades of the axes and the cutting edges of the swords are dressed down and finished with sandpaper and the steel parts represented by covering the wood with tinfoil. When putting on the tinfoil, brush a thin coat of glue on the part to be covered and quickly lay on the foil. If a cutting edge is to be covered the tinfoil on one side of the blade must overlap the edge which is pasted on the opposite side. The other side is then covered with the tinfoil of a size that will not quite cover to the cutting edge. After laying the foil and allowing time for the glue to dry, wipe the surface with light strokes up and down several times using a soft piece of cloth.



Partisan, Fork and Halberd

A French partisan of the sixteenth century is shown in Fig. 1. The weapon is 6½ ft. long with a round handle having the same circumference

for the entire length which is covered with crimson cloth or velvet and studded all over with round-headed



Spontoon, Glaive and Voulge

brass nails. The spear head is of steel about 15 in. long from the point where it is attached to the handle. The widest part of the blade from spear to spear is about 8 in. The length of the tassel or fringe is about 4 in.

Figure 2 shows a German military fork of the sixteenth century, the length of which is about 5 ft. with a handle of wood bound with heavy cord in a spiral form and the whole painted a dark color. The entire length of the fork from the handle to the points is about 10 in., and is covered with tinfoil in imitation of steel.

A Swiss halberd of the sixteenth century is shown in Fig. 3. This combination of an axe and spear is about 7 ft. long from the point of the spear to the end of the handle, which is square. The spear and axe is of steel with a handle of plain dark wood. The holes in the axe can be bored or burned out with red-hot iron rods, the holes being about ¼ in. in diameter.

Figure 4 shows an Austrian officers' spontoon, used about the seventeenth century. It is about 6 ft. long with a round wooden handle. The spear head

from its point to where fixed on the handle is about 9 in. long. The edges are sharp. The cross bar which runs through the lower end of the spear can

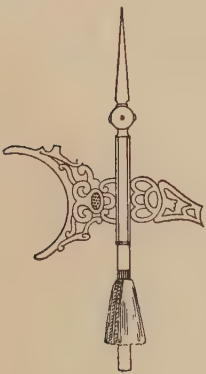


FIG. 7

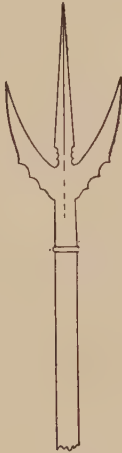


FIG. 8



FIG. 9

Halberd, Ranseur and Lance

be made in two pieces and glued into a hole on each side. The length of this bar is about 5 in. The small circular plate through which the bar is fixed can be cut from a piece of cardboard and glued on the wooden spear.

A gisarm or glaive, used by Italians in the sixteenth century, is shown in Fig. 5. The entire length is about 6½ ft. The blade is engraved steel with a length of metal work from the point of the spear to where it joins the handle or staff of about 18 in. It has a round wooden handle painted black or dark brown. The engraved work must be carved in the wood and when putting the tinfoil on, press it well into the carved depressions.

Figure 6 shows a Saxon voulge of the sixteenth century, 6 ft. long, with a round wood handle and a steel axe or blade, sharp on the outer edge and held to the handle by two steel bands, which are a part of the axe. The bands can be made of cardboard and glued on to the wood axe. These bands can be made very strong by reinforcing the cardboard with a piece of canvas. A small curved spear point is carved from a piece of wood, covered with tinfoil and fastened on the end of the handle as shown. The band of metal on the

side is cut from cardboard, covered with tinfoil and fastened on with round-headed brass or steel nails.

A very handsome weapon is the German halberd of the sixteenth century which is shown in Fig. 7. The entire length is about 6½ ft., with a round wooden handle fitted at the lower end with a steel ornament. The length of the spear point to the lower end where it joins on to the handle is 14 in. The extreme width of the axe is 16 or 17 in. The outer and inner edges of the crescent-shaped part of the axe are sharp. This axe is cut out with a scroll or keyhole saw and covered with tinfoil.

An Italian ranseur of the sixteenth century is shown in Fig. 8. This weapon is about 6 ft. long with a round staff or handle. The entire length of the metal part from the point of the spear to where it joins the staff is 15 in. The spear is steel, sharp on the outer edges.

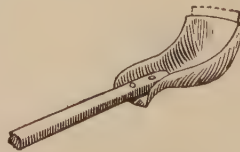
Figure 9 shows a tilting lance with vamplate used in tournaments in the sixteenth century. The wood pole is covered with cloth or painted a dark color. At the end is a four-pronged piece of steel. The vamplate can be made of cardboard covered with tinfoil to represent steel and studded with brass nails. The extreme length is 9 ft.

The tassels or fringe used in decorating the handles can be made from a few inches of worsted fringe, about 4 in. long and wound around the handle or staff twice and fastened with brass-headed nails.

An Emergency Babbitt Ladle

Take an old stove leg and rivet a handle on it and then break the piece off which fastens on the stove. The large and rounding part of the leg makes the bowl of the ladle.

This ladle will be found convenient for melting babbitt or lead.—Contributed by R. H. Workman, Loudonville, Ohio.

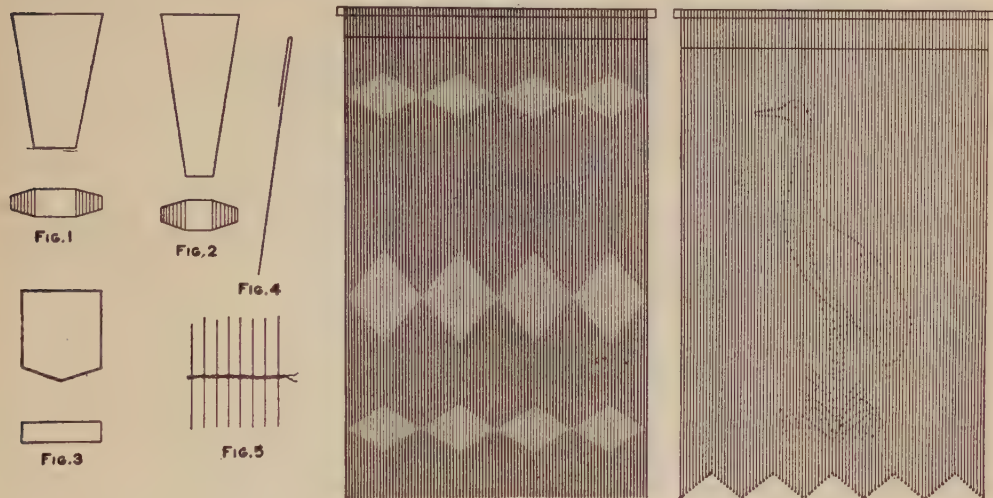


How to Make Japanese Portieres

These very useful and ornamental draperies can be easily made at home by anyone possessing a little ingenuity. They can be made of various materials, the most durable being bamboo, although beads of glass or rolled paper will produce good results. Substances such as straw, while readily adaptable

make a rough sketch of the design on paper. This will greatly aid the maker in carrying on the work.

When the main part of the screen is finished, the cross cords, used for spacing and binding the whole together, are put in place. This is done with a needle made from a piece of small wire,



Bamboo and Straw Portieres

and having a neat appearance, are less durable and will quickly show wear. The paper beads are easily made, as shown in Figs. 1, 2 and 3. In Figs. 1 and 2 are shown how the paper is cut tapering, and as it appears after rolling and gluing down the ends. A straight paper bead is shown in Fig. 3.

The first step is to select the kind of beads desired for stringing and then procure the hanging cord. Be sure to get a cord of such size that the beads will slip on readily and yet have the least possible lateral movement. This is important to secure neatness. One end of each cord is tied to a round piece of wood, or in holes punched in a leather strap. Iron or brass rings can be used if desired.

Cut all the cords the same length, making allowance for the number of knots necessary to produce the design selected. Some designs require only one knot at the bottom. It is best to

as shown in Fig. 4. The cross cords are woven in as shown in Fig. 5. As many of these cross cords can be put in as desired, and if placed from 6 to 12 in. apart, a solid screen will be made instead of a portière. The twisted cross cords should be of such material, and put through in such manner that they will not be readily seen. If paper beads are used they can be colored to suit and hardened by varnishing.

The first design shown is for using bamboo. The cords are knotted to hold the bamboo pieces in place. The finished portière will resemble drawn work in cloth. Many beautiful hangings can be easily fashioned.

The second design is to be constructed with a plain ground of either straw, bamboo or rolled paper. The cords are hung upon a round stick with rings of metal to make the sliding easy. The design is made by stringing beads of colored glass at the right

ished portiere will resemble drawn work in cloth. Many beautiful hangings can be easily fashioned.

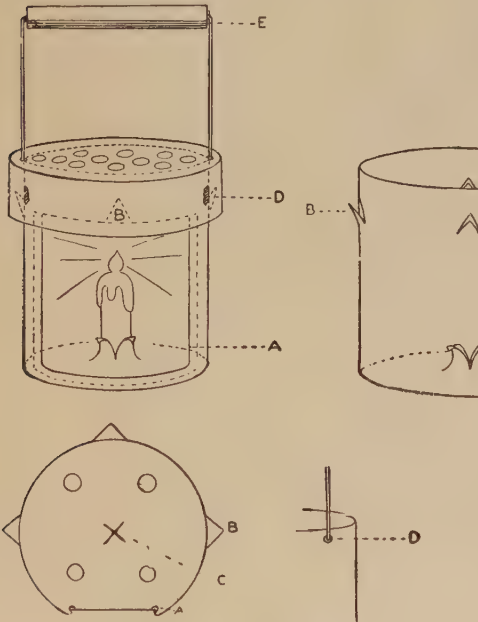
The second design is to be constructed with a plain ground of either straw, bamboo or rolled paper. The cords are hung upon a round stick with rings of metal to make the sliding easy.

The design is made by stringing beads of colored glass at the right places between the lengths of ground material. One bead is placed at the extreme end of each cord. The rows of twisted cord placed at the top keep the strings properly spaced.—Contributed by Geo. M. Harrer, Lockport, N. Y.

Makeshift Camper's Lantern

While out camping, our only lantern was accidentally smashed beyond repair and it was necessary for us to devise something that would take its

place. The design is made by stringing beads of colored glass at the right places between the lengths of ground material. One bead is placed at the extreme end of each cord. The rows of twisted cord placed at the top keep the strings properly spaced.—Contributed by Geo. M. Harrer, Lockport, N. Y.



Lantern Made of Old Cans

place. We took an empty tomato can and cut out the tin 3 in. wide for a length extending from a point 2 in. below the top and to within $\frac{1}{4}$ in. of the bottom. Each side of the cut-out A was bent inward in the shape of a letter S, in which was placed a piece of glass. Four V-shaped notches were cut as shown at B near the top of the can and their points turned outward. A slit was cut in the bottom, shaped as shown at C, and the pointed ends thus

New Tires for Carpet-Sweeper Wheels

The rubber tires on carpet-sweeper wheels often become so badly worn and stretched that they fail to grip the carpet firmly enough to run the sweeper. To remedy this, procure some rubber tape a little wider than the rims of the old wheels, remove the old rubber tires and wind the tape on the rims to the proper thickness. Trim the edges with a sharp knife and rub on some chalk or soapstone powder to prevent the tape from sticking to the carpet. A sweeper treated in this manner will work as well as a new one.—Contributed by W. H. Shay, Newburgh, N. Y.

How to Make an Ornamental Brass Flag

The outlines of the flag—which may be of any size to suit the metal at hand—and the name, are first drawn on a sheet of thin paper and then transferred to the brass by tracing through a sheet of carbon paper. The brass should be somewhat larger than the design.

The brass is fastened to a block of soft wood with small nails driven

through the edges. Indent the name and outline of the flag with a small chisel with the face ground flat, about $\frac{1}{8}$ in. wide. This should be done gradually, sinking the lines deeper and deeper by going over them a number of times. After this is finished, the brass is loosened from the block, turned over but not fastened, and the whole outside of and between the letters is indented with the rounded end of a nail, giving the appearance of hammered brass.

The edges are now cut off and four holes drilled, two for the chain by which to hang the flag to the wall, and two along the side for attaching the staff. The staff is a small brass rod with a knob attached to the top end.

It would be well to polish the brass at first, if the finished work is to be



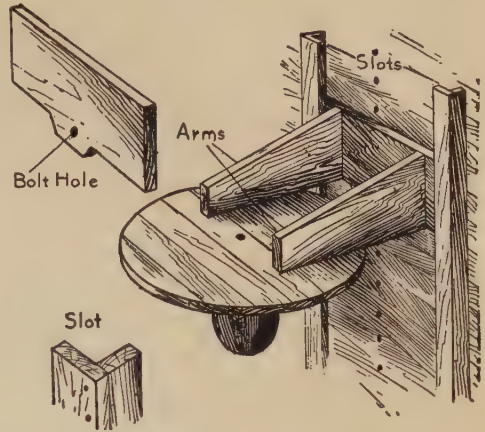
The Finished Flag

bright, as it cannot be done after the flag is completed. A coat of lacquer is applied to keep it from tarnishing. This is done by heating the brass and quickly applying a coat of shellac.—Contributed by Chas. Schaffner, Maywood, Ill.

An Adjustable Punching-Bag Platform

A punching-bag platform, suitable for the tall athlete as well as the small boy, is shown in the accompanying sketch. The platform is securely fastened to two strong wooden arms or braces, which in turn are nailed to a

2 by 12-in. plank as long as the diameter of the platform. This plank, as shown in the small drawing at the

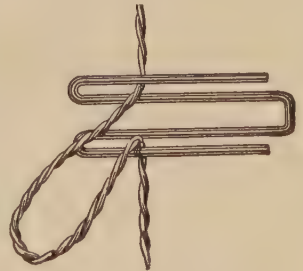


Adjustable Platform

upper left-hand corner of the sketch, is placed in grooves or slots fastened against the side of a wall. The plank with the platform attached may be raised or lowered to the desired height and held there by a pin or bolt put through the bolt-hole of the plank and into a hole in the wall.—Contributed by W. A. Jaquythe, Richmond, Cal.

Clasp for Holding Flexible Lamp Cords

A very easily made drop-light adjuster is shown in the illustration. It consists of a piece of copper wire $\frac{1}{8}$ in. in diameter, bent as shown. This clasp is capable of standing a strong pull and will hold the lamp and socket with a glass shade.—E. K. Marshall, Oak Park, Ill.



Camel hair brushes for painters' use should never be allowed to come in contact with water.



Curb Bridge for the Driveway

This curb bridge is equally good for temporary or permanent use as an approach to a private driveway. Three supports, made of $\frac{3}{8}$ -in. flat iron, are bent to form hooks, as indicated in the cross-section view. They are placed at the ends and center of a 2-in. plank of suitable length. Bolts are used to fasten the hooks to the plank and the bridge is hooked over the curb as shown.—Lester P. Young, Culver, Ind.

Repair for Leaky Water Pipe

One morning upon waking we found the bathroom floor flooded with water and soon discovered that this was due to a leaky pipe. An emergency repair had to be made at once, so I got a small screw and a rubber washer, placed these in the leak, as shown, and ran a length of soft wire around the pipe, and through the groove in the screwhead, twisting the ends together with a pair of pliers. This drew the screwhead and washer up against the leak



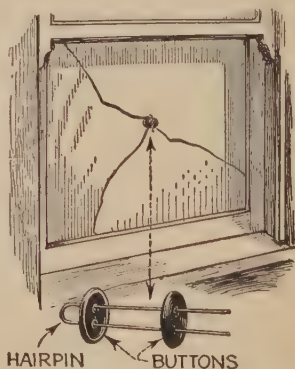
firmly and stopped it effectively until a more permanent repair could be made.—C. M. Wilcox, Torrington, Conn.

Matching New Wood with Old

When a new piece of wood is to be set into old wood, which often happens in repair work, it is a simple matter to match the two in color. If the new piece is too dark, bleach it by applying a solution (used when cold) of one large tablespoonful of oxalic-acid granules in 1 pt. of hot water with a brush, until it is the same as the old. If it is lighter, give it one or more coats of liquid ammonia, until it matches. Then stain, fill and varnish the surface in the usual way.—Francis W. Henry, Pottsville, Pa.

Buttons and Hairpin Mend Broken Glass Panes

When a window pane is broken so that it needs a support in the center to keep the pieces from dropping out, the method shown in the illustration will be found serviceable. Two buttons and a hairpin are used. The hairpin is slipped through two holes of the first button, through the crack or hole, and then through the second button on the other side of the glass. Then the two ends of the hairpin are grasped with a pair of pliers and drawn up and twisted until tight. The raised rims on the front of the buttons should bear against the glass.—Dr. Halliburton, Moberly, Mo.



Tips for Sewing-Machine Users

If the top thread used in a sewing machine is wiry and hard, the loop through which the shuttle passes will not form correctly and this will result in skipped or missed stitches. This fault can be corrected by applying whale or sperm oil to

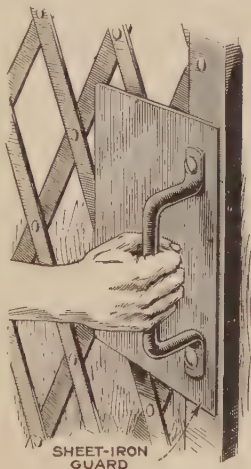
the thread. Moisten a small piece of sponge and attach it to the machine so that the thread will absorb oil as it rubs over the sponge.

Here are three ways to remove the needle when it is stuck or held fast in the needle bar: One is to remove all the threads and run the machine at high speed; the second, to take out the needle screw, put a needle with the point broken off in the screw hole and pry or force the tight needle out of the bar, and the third is to tap or hit the needle bar gently with a piece of wood.

To prevent the shuttle or bobbin thread from spilling or coming out of position, use a soft-finish thread underneath, especially on high-speed work or when long rows are to be sewed. If new needles are tight in the bar and have to be forced up, the needle hole can be made larger by grinding a needle flat at the top of the shank, leaving a fine burr. Move the needle up and down in the hole and the burr will scrape sufficient metal away to enable new needles to be inserted very easily. The take-up spring tension should never exceed that of the top-thread tension when a correct lockstitch is desired.—J. D. Calvert, London, Can.

Plate Safeguards Elevator Door

After an elevator operator had his fingers caught and injured in the sliding collapsible gate, a safety guard was fastened under the handle as shown in the illustration. It consists of a piece of $\frac{1}{16}$ -in. sheet metal attached to the edge of the door securely by the same screws that hold the handle on. This will not interfere with the operation of the door in any way. The edges are carefully filed down to make a neat job and avoid injury from them.—Frank Harazim, New York City.



Ordinary Farm Pump Converted into a Sanitary Drinking Fountain

Sanitary Drinking Fountain on the Pump

It is an easy matter to install a sanitary drinking fountain on an ordinary pump. Drill and tap a $\frac{1}{2}$ -in. hole in the top of the spout and get a 2-ft. length of $\frac{1}{2}$ -in. copper tubing. Clean the tubing thoroughly and then thread one end so that it can be screwed into the tapped hole. Bend the tubing carefully so that it passes back to the pump, where it is wired on securely. Then the other end is bent up vertically, as indicated. A wooden plug is made to fit the spout snugly and is tied to the pump with a length of chain or rope. In use, the spout is plugged, causing the water to rise in the tubing when one pumps. The pressure on the handle determines the height of the stream.—L. B. Robbins, Harwich, Massachusetts.

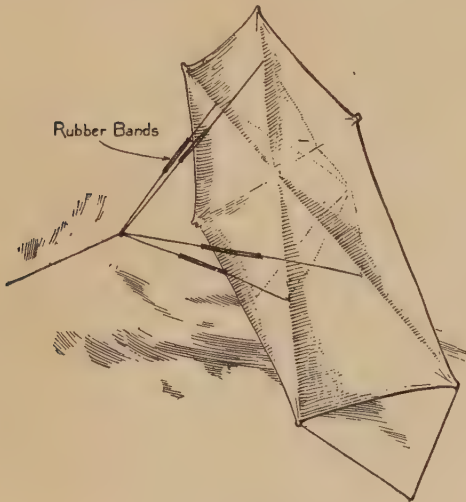
A Substitute Tie Clasp

An ordinary paper clip will serve as an efficient tie clasp, as shown in the photo. If you have facilities for providing a plating bath, the clip may be gold or silverplated, thereby improving its appearance considerably.—K. B. Murray, Sturgis, Mich.



Rubber Bands in Kite Balancing Strings

Kite flyers will find it to their advantage to place rubber bands of suit-

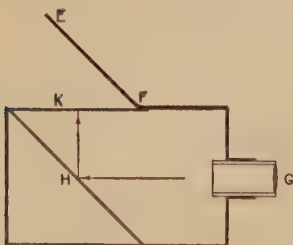


Bands in String

able size in the balancing strings to the kite, as shown in the illustration. This will prevent a "break-away" and also make the right pull, if only two bands are put in the lower strings.—Contributed by Thos. DeLoof, Grand Rapids, Michigan.

An Aid in Sketching

Sketching requires some little training, but with the apparatus here illustrated an inexperienced person can



obtain excellent results. The apparatus is made of a box 8 in. deep, 8 in. wide and about 1 ft. long. A dou-

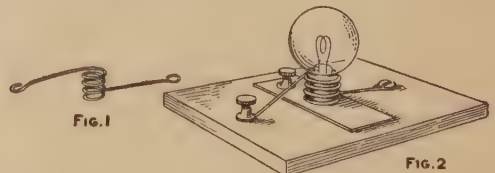
ble convex lens, G, is fitted in a brass tube which should have a sliding fit in another shorter and larger tube fastened to the end of the box. A mirror, H, is set at an angle of 45 deg.

in the opposite end of the box. This reflects the rays of light passing through the lens to the surface K, which may be either of ground or plain glass. The lid or cover E F protects the glass and keeps the strong light out when sketching. The inside of the box and brass tube are painted a dull black.

In use, the device is set with the lens tube directed toward the scene to be painted or sketched and the lens focused so the reflected picture will be seen in sharp detail on the glass. Select your colors and put them on the respective colors depicted on the glass. If you wish to make a pencil drawing, all you have to do is to fill in the lines in the picture on the ground glass. If a plain glass is used, place tracing paper on its surface, and the picture can be drawn as described.

How to Make Miniature Electric Lamp Sockets

A socket for a miniature lamp can be made as shown in the sketch. A brass spring wire is wound around the base of the threads on the lamp and an eye turned on each end to receive a screw and a binding-post, as shown in Fig. 1. A piece of metal, preferably copper, is attached to a wood base as shown in Fig. 2 and the coil-spring socket fastened across it in the opposite direction. Bend the wire so that the spring presses the lamp against the metal. If the wire fits the lamp loosely, remove the lamp and press the sides of the coil closer together. The metal parts can



Wire Socket

be attached to any smooth surface of wood without making a regular base.—Contributed by Abner B. Shaw, No. Dartmouth, Mass.

Imitation Arms and Armor—Part V

The preceeding chapters gave descriptions of making arms in imitation of ancient weapons, and now the amateur armorer must have some helmets to add to his collection. There is no limit to the size of the helmet, and it may be made as a model or full sized. In constructing helmets, a mass of clay of any kind that is easily workable and fairly stiff, is necessary, says the English Mechanic, London. It must be kept moist and well kneaded. A large

The fleur-de-lis are slightly raised, as in bas-relief. To aid in getting the helmet in correct proportion on both sides, and over the crest on top, cut out the shape from a piece of wood, as shown in Fig. 3, with a keyhole saw. This wood being passed carefully and firmly over the clay will bring it into shape, and will also show where there may be any deficiencies in the modeling, which can then be easily remedied by adding more clay. The cut-out



Fig 1

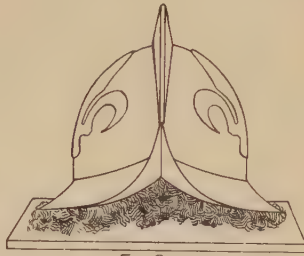


Fig 2



Fig 3



Fig 4

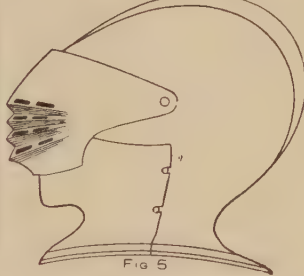


Fig 5

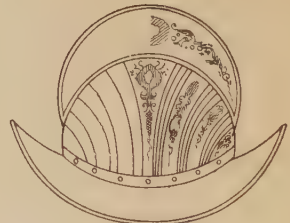


Fig 6

Making the Clay Model and Three Helmet Designs

board or several planks, joined closely together, on which to place the clay, will be necessary. The size of this board will depend on the size of the work that is intended to be modeled upon it.

The way to make a helmet is described in the following method of producing a German morion, shown in Fig. 1. This helmet has fleur-de-lis in embossed work, and on each side is a badge of the civic regiment of the city of Munich. The side view of the helmet is shown in Fig. 1.

The clay is put on the board and modeled into the shape shown in Fig. 2. This is done with the aid of a pair of compasses, a few clay-modeling tools, and the deft use of the fingers.

pattern shown in Fig. 4 is the side outline of the helmet.

Scraps of thin, brown, wrapping paper are put to soak in a basin of water to which has been added about a tablespoonful of size melted and well stirred, or some thin glue, and left over night to soak. The paper should be torn in irregular shapes about as large as the palm of the hand. After the clay model is finished, give it a thin coat of oil—sweet or olive oil will answer the purpose very well. All being ready, the clay model oiled, and the basin of soaked paper near to hand, take up one piece of paper at a time and very carefully place it upon the model, pressing it well on the clay and into and around any crevices and pat-

terns, and continue until the clay is completely covered.

This being done, give the paper a thin and even coating of glue, which must be quite hot and put on as quickly

In Fig. 6 is shown an Italian casque of a foot soldier of the sixteenth century. This helmet may have the appearance of being richly engraved as shown in one-half of the drawing, or,

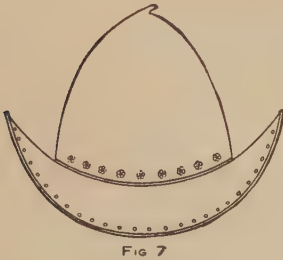


FIG 7



FIG. 8

Ancient Helmets

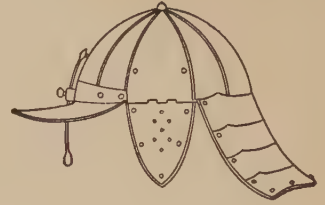


FIG. 9.

as possible. Put on a second layer of paper as carefully as before, then another coating of glue, and so on, until there are from four to six coats of glue and paper. When dry, the paper coating should be quite stout and strong enough for the helmet to be used for ornamental purposes. Before taking it off the model, which should be no difficult matter, owing to the clay being oiled, trim off any ragged edges of paper with a sharp knife, and smooth and finish all over with some fine sandpaper. The paper is then given a thin coat of glue and sections of tinfoil stuck on to give it a finished appearance. When the helmet is off the model, make holes with a small awl at equal distances, through which to insert some fancy brass nails, bending the points over and flat against the inside of the helmet.

A vizor helmet is shown in Fig. 5. This helmet has a movable vizor in the front that can be lifted up, a crest on top, and around the neck a narrow gorget which rests upon the wearer's shoulders. The whole helmet, with the exception of the vizor, should be modeled and made in one piece. The vizor can then be made and put in place with a brass-headed nail on each side. The oblong slits in front of the vizor must be carefully marked out with a pencil and cut through with a knife or chisel.

a few lines running down, as seen in the other part of the sketch, will make it look neat. The band is decorated with brass studs.

An Italian cabasset of the sixteenth century is shown in Fig. 7. This helmet is elaborately decorated with fancy and round-headed nails, as shown in the design.

In Fig. 8 is shown a large bassinet with a hinged vizor which comes very much forward, so as to allow the wearer to breathe freely. This helmet was worn about the sixteenth century, and was probably used for tilting and tournaments.

A burgonet skull-cap of the seventeenth century is shown in Fig. 9. The vizor is composed of a single bar of metal, square in shape, which slides up and down in an iron socket attached to the front of the helmet, and is held in any position by a thumbscrew as shown in the illustration.

A hole in the peak of the helmet allows it to hang in front of the wearer's face. This contrivance should be made of wood, the helmet to be modeled in three pieces, the skullcap, peak and lobster shell neck guard in one piece, and the ear guards in two pieces, one for each side. The center of the ear guards are perforated. All of the helmets are made in the same manner as described for Fig. 1. They are all covered with tinfoil.

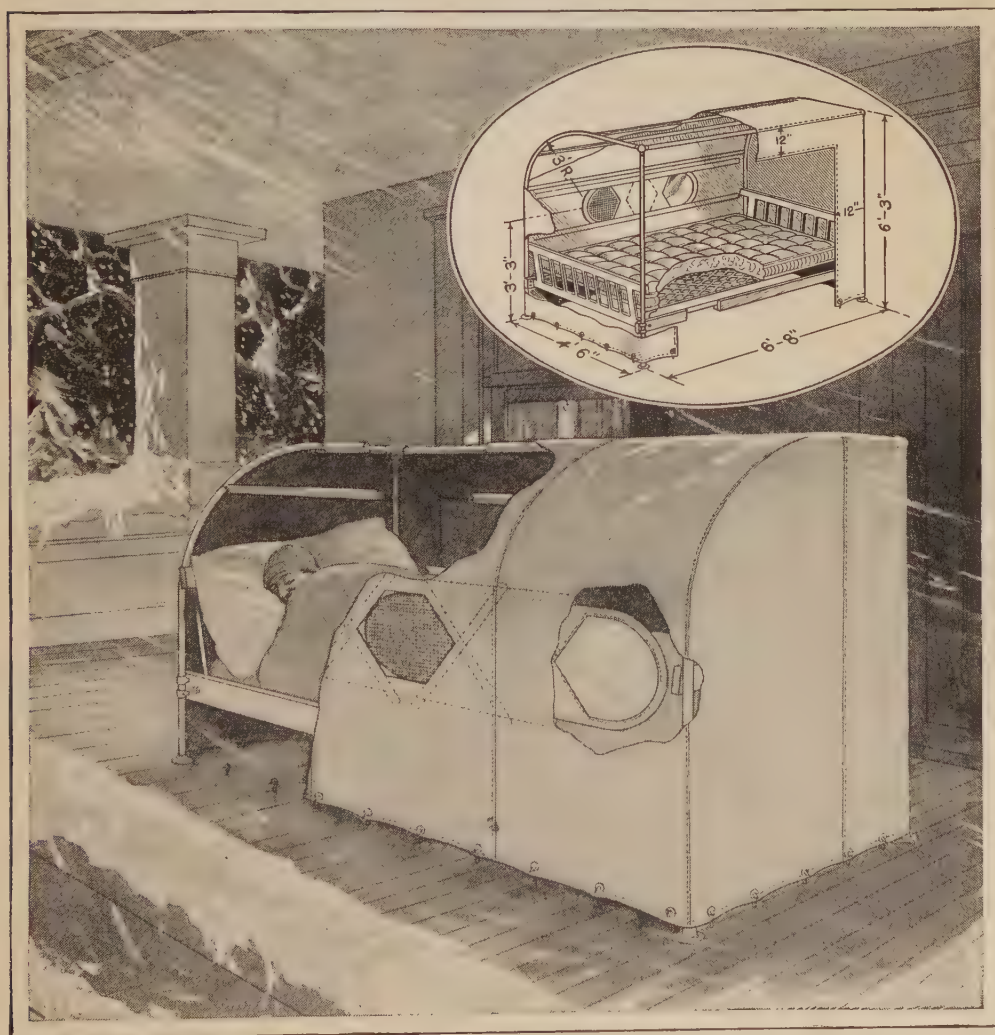


A Comfortable Outdoor Sleeping Tent

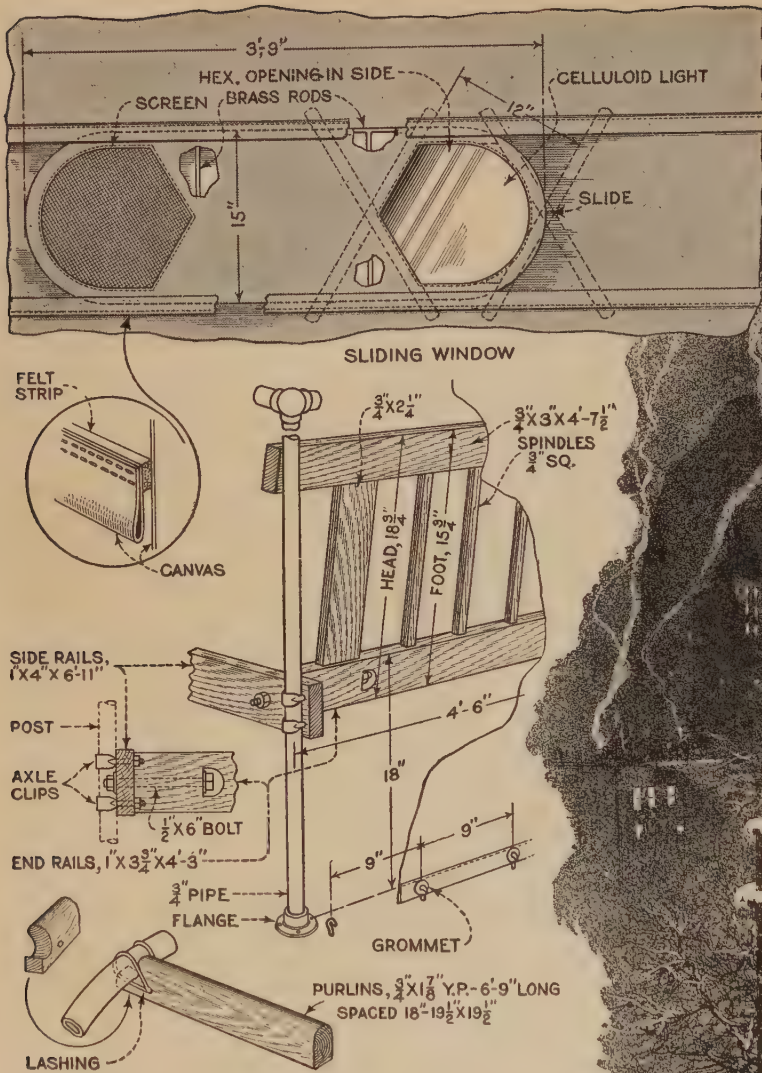
By JAMES W. PEARL

OUTDOOR sleeping throughout the year is one of the best means of promoting health, and the construction of the porch bed shown in the photo has a uni-

versal appeal to all lovers of fresh air. From government surveys in Louisiana during the summer season and in Dakota during the winter, and from years of ex-



Tent Bed That Admits Plenty of Fresh Air, without Exposure to Drafts, Rain or Snow



Constructional Details and Dimensions of the Sliding Window; Method of Attaching the Side Rails and Purlins to the Frame, and Use of Grommets to Hold the Canvas Down Tight

perience in tent life, the writer has collected ideas for the improvement of outdoor-sleeping accommodations, which are incorporated in this article. The covering of the tent is canvas and the fresh air will filter through the fabric at all times, while insects, drafts, rain and snow are excluded. The frame is secure in all kinds of weather, except storms of tornado character, so there is no danger of the tent collapsing while the occupant is sleeping.

The drawings show the construction and all the necessary dimensions so that anyone can build the tent and no difficulties will be encountered in assembling it. All

the irregularities on the outside of the pipes in the frame are removed by draw-filing so that chafing of the canvas will be minimized; ball-type pipe fittings are specified for the same reason. A 1-in. board with one edge dressed to a curve of 3-ft. radius, is firmly clamped in a vise to make a form for bending the longer pipes cold. Set one of the end frames up at the desired location of the booth and fasten it to the floor with heavy screws, flanges being provided on the lower ends of the frame as indicated. Hold the other end frame up in its approximate position and insert the top cross pipe into the fittings on both end

frames, which have a right and left-hand thread, respectively, so that turning the cross pipe one way will screw it in. Screw the second end frame down to the floor. Bend the axle clips to fit the pipe, and attach the siderails to the frame at the proper height. Place the purlins, as shown, at intervals of about 18 in. from the top cross pipe and about the same distance from each other. These are lashed in position with strong fishline passed around the pipe and through a hole drilled near the end and bottom of the purlins. The upper edges of the purlins should be rounded so that they will not chafe the canvas. Round the corner holes to facilitate drawing the purlins tight without splitting them. The spindle and endpieces in the head and footrails are tenoned, mortised and glued into the top and bottom members of these rails, which are made to fit at either end of the booth. The head and footrails are attached to the siderails with a single-mortise machine bolt at each end at the bottom, and the extra length at the top rests against the pipe posts.

Three pieces of canvas, 28½ in. wide and 10 ft. 9 in. long, are required for the top and back; these are lapped and made into one piece by two or three lines of stitching through the laps, hemmed on both ends and provided with grommets, spaced about 9 in. apart in the hem along the bottom. Cut and hem the opening for the window with center on center line and about 39 in. above the floor, slotting the hem at the bottom so that it will be inside of the sash for shedding rain. Webbing, located as shown and stitched to the inside, provides guides for the sliding sash and forms a weather-proof contact with the outer canvas. Two and one-half widths of canvas, 6 ft. 9 in. long, are required for each end cover. They are lapped and sewed along the bottom and mitered at the upper front corner in the same way as the center section of the cover, and have tapes attached along the inside for tying to the front posts. All the canvas may now be placed on the frame, stretched tight, fitted and marked for the final seams along the rear posts, curve and top.

The window frame is formed of two brass rods bent to a U-shape, the ends of which are brought together in a ferrule and firmly soldered. Two brass upright rods of the same stock are soldered in place, as shown, to take the tension of the panes of canvas, celluloid and copper screen which are stretched in place and held by canvas or tape binding, securely

stitched. A curtain made of three widths of canvas, hung with hooks made of ¾-in. soft brass wire at intervals of about 9 in. along the ridge pipe, and taped along the edges for tying to the corner posts, is provided for storm and winter protection. A standard-size spring, mattress, blankets and pillows complete the equipment.

Cheap Watering Trough

A farmer who did not want to construct an expensive concrete watering trough for his cows used three old wooden tubs



Farmer Uses Three Wooden Tubs as a Watering Trough for His Cattle

connected by zinc channels. The water was supplied from a faucet and filled first one tub and then the second and third, as indicated in the illustration.—Frank Harazin, New York City.

Hulling Black Walnuts

Allow the walnuts to lie on the ground under the tree until the outside hull is black and crusty. Then gather them up in baskets and run them through a corn sheller. This method will strip the shells from them almost as well as it can be done by hand and is much quicker, easier and cleaner. After being hulled, the walnuts should be kept in a dry place, not too many of them together.

Making a Power-Driven Ice Bicycle

Latest Winter Diversion for the Youngsters with Homemade Device Found Thrilling But Safe

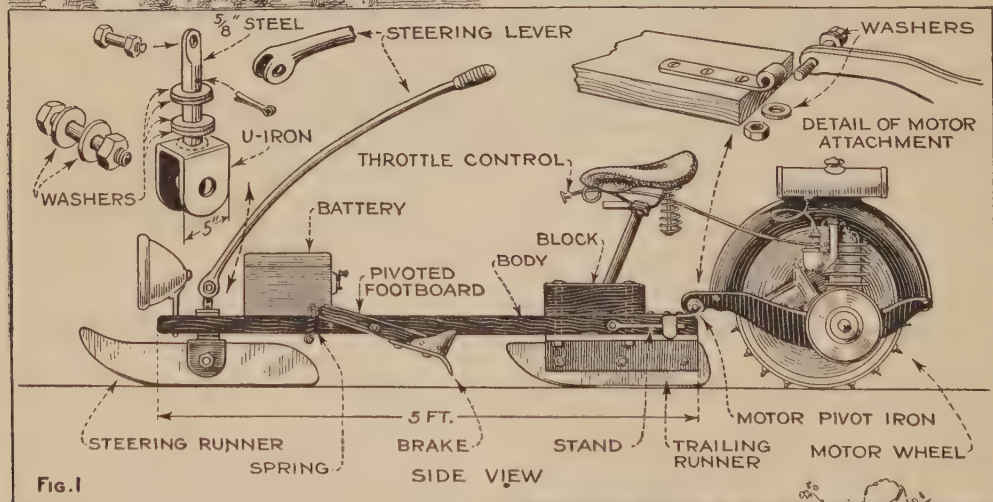
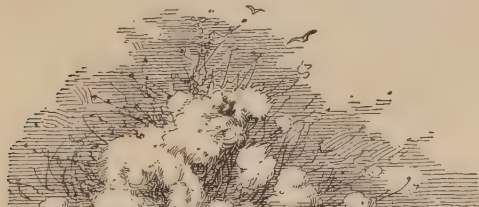
By L. B. ROBBINS

WHEN snow-filled roads make the use of the bicycle impossible and outdoor sport seems limited, it is time to build the fast ice speeder shown in the drawings. It is simple in design and the parts can readily be obtained, so that anyone who has a little mechanical skill can build it. A motor wheel, such as used with bicycles and children's autos, provides the power. On smooth ice it is possible to make 35 to 40 miles per hour, and with a fair wind behind much greater speed can be expected.

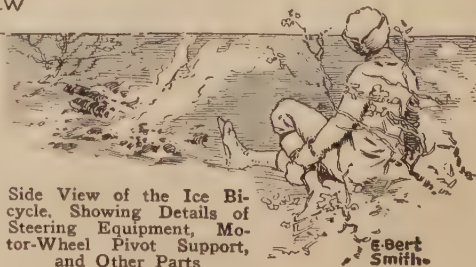
Practically all the parts necessary in the construction of this device can be picked up at any garage or automobile junk yard. The body consists of a 2-in.

Any auto headlight with a vertical support can be used.

About 6 in. behind the first hole drill a $\frac{3}{4}$ -in. hole for the steering-runner post. A few inches behind this, say about 1 ft. from the front edge of the board, a storage-battery box or a box for dry cells is attached. This battery is to furnish current for the headlight and for a horn or bell, if desired. Next, measure 2 ft. from the front end and drill a $\frac{1}{2}$ -in. hole through the board from edge to edge, taking care to drill it through the exact center and at right angles to the edges. A long bit, the kind used by electricians, will have to be used for this purpose. A piece of $\frac{1}{2}$ -in. iron rod, 28 in. long and threaded at both ends, is pushed through this hole, to project 9 in. on either side. The footboards, to which the brakes are attached, are bored through and pivoted on these projections, and consist of two pieces of 1-in. hardwood, about 1 ft. long and 8 in. wide. Round the back end of each and screw on a semicircular piece of



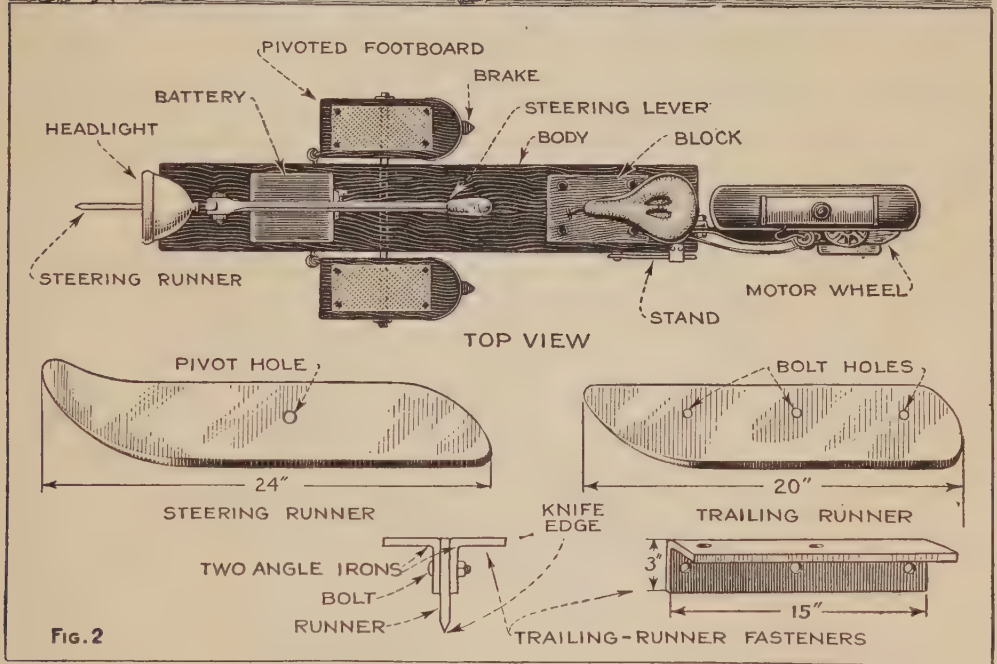
plank, 5 ft. long and 10 in. wide, planed smooth on both sides. The corners are rounded slightly and both sides and edges are given a thorough application of linseed oil to protect the wood against the weather. Drill a hole through the center of the plank, about 1 in. from the front end. This is for the headlight post.



Side View of the Ice Bicycle, Showing Details of Steering Equipment, Motor-Wheel Pivot Support, and Other Parts

thin sheet metal to make a heel guard, then tack a piece of rubber matting on the top side for treads. Nuts are driven on the threaded ends to hold the footboards on and a couple of washers are used between the footboards and the body to prevent binding. Small coil springs are attached to the front edge of the foot-

Top View Showing How the Footboards Are Pivoted, Details of Runner Construction and Their Dimensions



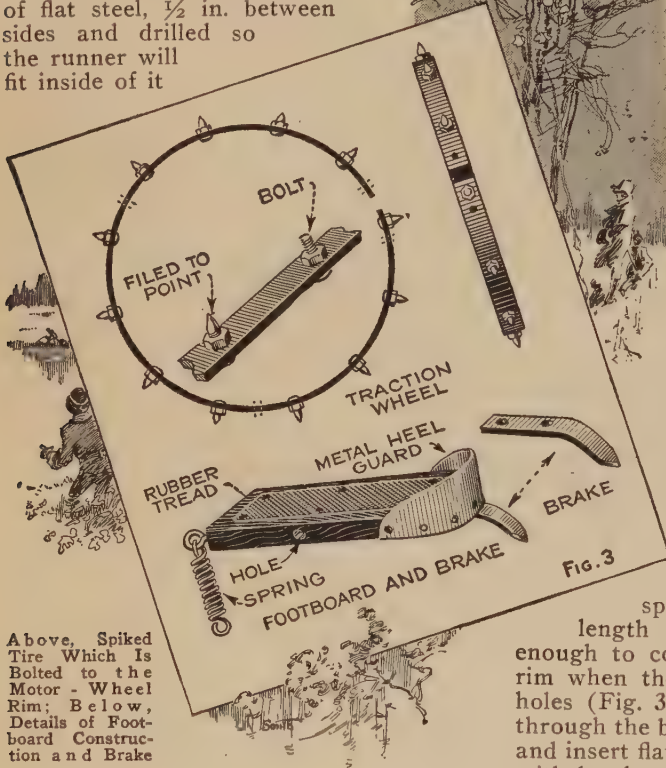
boards and to the body, as indicated, to hold them up against normal foot pressure. Underneath the footboards, at the rear, a piece of steel rod, bent down sharply and ground to a sharp point, is screwed on, to act as a brake, as shown in Fig. 3.

The motor-wheel attachment (see Fig. 1) consists of a piece of flat steel about 10 in. long, with one end bent over to form an eye, $\frac{1}{2}$ in. in diameter. Three holes are drilled through the flat portion and it is bolted to the plank, about 2 in. from the left edge, so that the eye projects slightly over the rear end of the plank and turns upward. Then cut a block of wood,

1 ft. long, 4 in. deep and 6 in. wide, and place it on the bank 6 in. from the rear end, in the position indicated in Figs. 1 and 2. Toenail it to the plank temporarily and drill a vertical hole in each corner, through both block and plank, leaving the permanent fastening until later.

The runners are shown in Fig. 2. They are made from sheet steel, $\frac{3}{8}$ in. thick and 6 in. wide. The steering runner is 24 in. long and the trailing runner 20 in. As will be noted, the steering runner is turned up slightly at the front so that it will be sure to ride over small obstructions. Drill a $\frac{1}{2}$ -in. pivot hole through the center of

the steering runner and three similar holes, in line and slightly nearer the top edge, in the rear runner. Then grind the bottom edges of the runners to a knife-edge. The steering mechanism is shown in Fig. 1. It consists of a U-shaped piece of flat steel, $\frac{1}{2}$ in. between sides and drilled so the runner will fit inside of it



Above, Spiked Tire Which Is Bolted to the Motor - Wheel Rim; Below, Details of Footboard Construction and Brake

and pivot on a short bolt through the holes shown. The post is a piece of $\frac{5}{8}$ -in. round steel riveted vertically into the top of the U-iron and flattened at the top. Place two washers over the U-iron, push the post through the hole in the plank, then place two more washers over the plank and drill the post for a cotterpin to prevent end play as much as possible. The end of a length of curved steel tubing or rod, which is used for the steering lever, should be split and drilled to bolt loosely over the flattened end of the post. This makes a flexible joint. Push a bicycle handlebar grip on the end.

The trailing runner is bolted between two steel angle irons 15 in. long and 3 in. wide on each leg, as shown in Fig. 2. This assembly is placed under the plank so the front ends of the angle irons are directly below the front of the block and in the exact center. Four holes are then drilled in the angles to coincide with the four

holes in the block. The block and runner irons can now be fastened solidly to the plank with four long bolts. Remove the nails from the block and drill a hole for a bicycle saddle post, at an angle through the block and plank, as shown. A small metal wedge driven in snugly will prevent the post from turning.

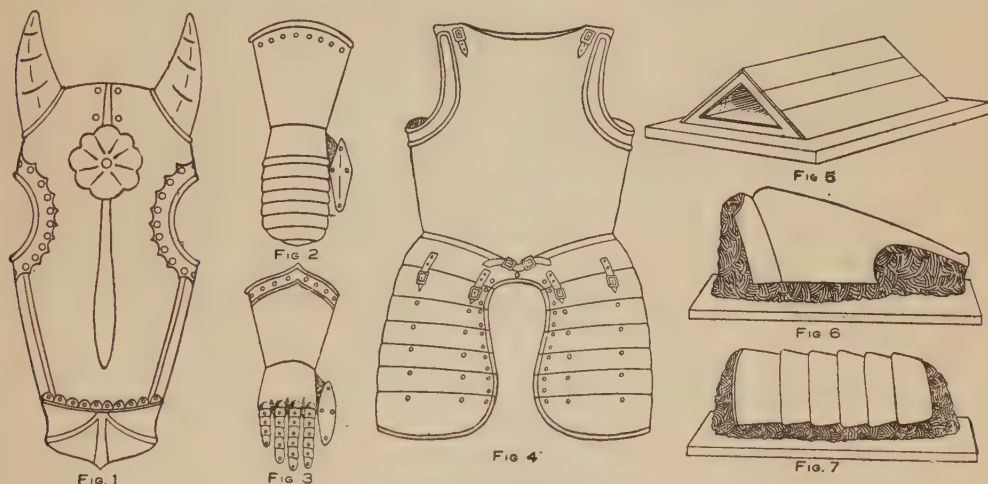
At the rear end, on one edge, pivot a short piece of round iron so that it can be turned down to keep the speeder upright when standing still. A spring clip holds this up when not in use. The body assembly is now completed. Give all wood and exposed metal a coat of bright paint and connect the headlight to the battery, using a switch to cut off the current when not used.

Traction for the motor wheel is provided by a spiked tire. This consists of a length of $\frac{1}{4}$ -in. flat steel, wide enough to conveniently fit in the wheel rim when the tire is removed. Drill 18 holes (Fig. 3 shows only some of them) through the band, at equal distances apart, and insert flat-head steel bolts, $\frac{3}{4}$ in. long, with heads on the inside. Run thin nuts down tightly on the outside and then file each bolt to a point, as in Fig. 3. Bend the strip to a circular shape to fit around the wheel and drill a hole near each end and two at other convenient points, and fasten the strip to the rim with bolts, similar holes being drilled in the rim. Attach the motor wheel to the pivot iron at the rear of the plank with a bolt just as it would be attached to a bicycle. Run the flexible throttle control through the saddle springs (see Fig. 1) to the front. Now, with the tank filled, you are ready for a trial. Set the spark and throttle and run along a few feet on the ice until the motor starts. Then step aboard the plank and seat yourself on the saddle, placing your feet on the footboards. Steer just as though riding a bicycle, but be careful to make wide turns as a short one might lead to a bad spill. To stop abruptly, shut off the motor and press down on the footboards with the heels.

Imitation Arms and Armor—Part VI

A mass of any kind of clay that is easily modeled and fairly stiff must be prepared and kept moist and well kneaded for making the models over which paper is formed to make the shape of the articles illustrated in these sketches. A modeling board must be made of one large board or several pieces joined closely together upon which to work the clay, says the English Mechanic, London. The size of the board depends upon the size of the work to be made.

torn in irregular shapes to the size of the palm of the hand and put to soak in a basin of water in which a table-spoonful of size has been dissolved. If size cannot be obtained from your local painter, a weak solution of glue will do equally well. All being ready, and the clay model oiled, take up one piece of paper at a time and very carefully place it on the surface of the model, pressing it on well and into and around any crevices and patterns. Continue this operation until the clay



Armor and Clay Models

An open chamfron of the fifteenth century is shown in Fig. 1. This piece of horse armor, which was used in front of a horse's head, makes a splendid center for a shield on which are fixed the swords, etc., and is a good piece for the amateur armorer to try his hand on in the way of modeling in clay or papier maché work. The opening for the animal to put his head into is semicircular, and the sides do not cover the jaws. As the main part of this armor is worn in front of the head the extreme depth is about 4 in. The entire head piece must be modeled in clay with the hands, after which it is covered with a thin and even coating of sweet or pure olive oil. A day before making the clay model some pieces of thin, brown wrapping paper are

model is completely covered on every part. This being done, give the paper a thin and even coating of glue, which must be quite hot and laid on as quickly as possible. Lay on a second layer of paper as carefully as before, then another coat of glue, and so on until there are five or six coats of glue and paper. When this is dry it will be strong enough for all ornamental purposes. The ragged edges of the paper are trimmed off with a sharp knife and the whole surface smoothed with fine sandpaper. Then carefully glue on sections of tinfoil to give the armor the appearance of steel. The armor is now removed from the model.

A mitten gauntlet of the fifteenth century is shown in Fig. 2. This can be made in one piece, with the ex-

ception of the thumb shield, which is separate. The thumb shield is attached to the thumb of an old glove which is fastened with round headed nails on the inside of the gauntlet.

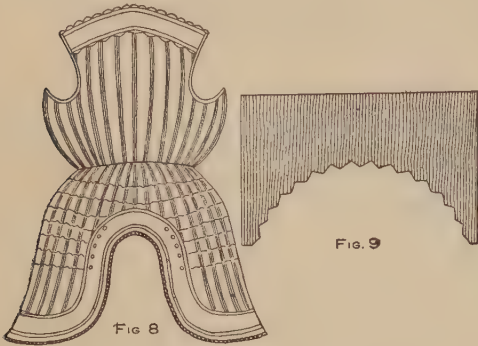


Fig. 8
Corrugated Breastplate and Former

The part covering the wrist is a circular piece, but the back is not necessary as it would not be seen when the gauntlet is hanging in its place.

In Fig. 3 is shown a gauntlet of the seventeenth century with separately articulated fingers. This gauntlet may be molded in one piece, except the thumb and fingers, which must be made separately and fastened with the thumb shield to the leather glove that is attached to the inside of the gauntlet, the same as in Fig. 2.

A breastplate and tassets of the sixteenth century are shown in Fig. 4. The tassets are separate and attached to the front plate with straps and buckles, as shown in the sketch. There is a belt around the waist which helps to hold the back plate on. Attached to the back of the plate would be two short straps at the shoulder. These are passed through the buckles shown at the top right and left-hand corners of the front plate. For decorative purposes the back plate need not be made, and therefore it is not described. The method of making armor is the same as of making helmets, but as larger pieces are formed it is well to use less clay owing to the bulk and weight.

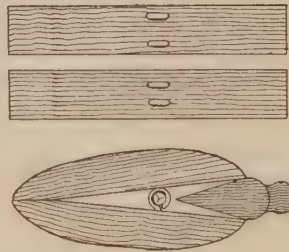
An arrangement is shown in Fig. 5 to reduce the amount of clay used. This triangular-shaped support, which

can be made in any size, is placed on the modeling board or bench and covered with clay. This will make the model light and easy to move around, and will require less clay. It is not necessary to have smooth boards; the rougher the better, as the surface will hold the clay. The clay forms modeled up ready to receive the patches of brown paper on the surface are shown in Figs. 6 and 7.

A German fluted armor used at the beginning of the sixteenth century is shown in Fig. 8. The breastplate and tassets of this armor are supposed to be in one piece, but for convenience in making it will be found best to make them separately and then glue them together after they are taken from the model. A narrow leather belt placed around the armor will cover the joint. Fluted armor takes its name from a series of corrugated grooves, $\frac{1}{2}$ in. in depth, running down the plate. A piece of board, cut into the shape shown in Fig. 9, will be very useful for marking out the fluted lines.

Home-Made Hand Vise

A vise for holding small articles while filing can be made as shown in



the illustration. The vise consists of three pieces of wood, two for the jaws and one a wedge.

The hinge for connecting the two jaws is made of four small screw eyes, two in each jaw. When locating the place for the screw eyes, place the two in one jaw so they will fit between the two of the other jaw. Put a nail through the eyes when the jaws are matched together and they are ready for the wedge in clamping the article to be filed.—Contributed by John G. Buxton, Redondo Beach, Calif.

Detector for Slight Electrical Charges

A thin glass bottle is thoroughly cleaned and fitted with a rubber stopper. A hole is made through the center of the stopper large enough to admit a small brass rod. The length of this rod will be governed by the shape of the bottle, but $3\frac{1}{2}$ in. will be about right. The bottom of the rod is bent and two pieces of aluminum foil, each about $\frac{1}{4}$ in. wide and $\frac{1}{2}$ in. long, are glued to it. The two pieces of foil, fastened to the rod, are better shown in Fig. 2. Fasten a polished brass ball to the top of the rod, and the instrument is ready for use. Place the article which you wish to test near the ball, and if it holds a

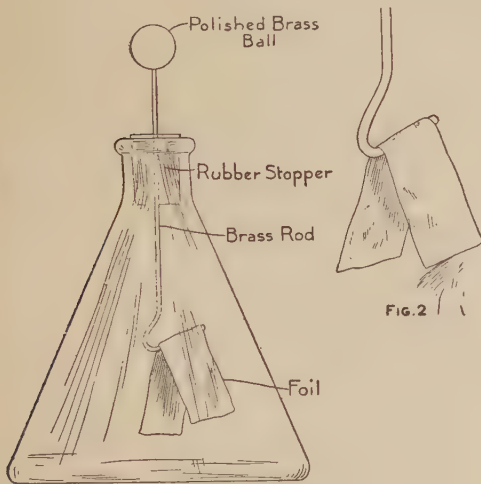


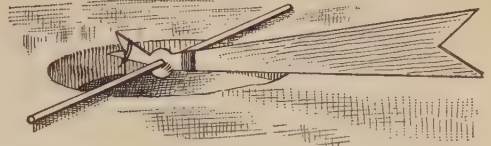
FIG. 1
Aluminum Foil in a Bottle

slight electrical charge, the two pieces of foil will draw together. If it does not hold a charge, the foils will not move.—Contributed by Ralph L. La Rue, Goshen, N. Y.

Fishing through Ice with a Tip-Up

The tip-up, used for signaling the fisherman when a fish is caught, is made of a $\frac{1}{4}$ -in. pine board, about 15 in. long, $2\frac{1}{2}$ in. wide at one end and narrowing down to about 1 in. at the other. At a point 6 in. from the smaller end, the board should be cut slightly wider and a $\frac{1}{2}$ -in. hole

bored through it. Two or three wrappings of fine copper wire may be wound around the board on each side



Tip-Up in Place

of the hole to give added strength. Both ends of the board should be notched deeply.

A long gash is cut in the ice and then a round hole is made with a chisel, as this will cut under the water without splashing. The chipped ice can be removed with a pail. A rod or round stick of wood is passed through the hole in the tip-up and placed across the round hole, as shown in the illustration.

The fishhook is baited in the usual way and hung on a line from the short end of the tip-up. When a fish is hooked, the other end will tip up and signal the fisherman. Any number of holes can be cut in the ice and a tip-up used in each, thus enabling one person to take care of as many lines.

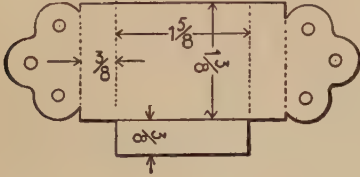
Home-Made Candle Holder

The candlestick or holder shown in the illustration is made of an ordinary tin can, such as is used for canning salmon or pot-roasted ham. Three triangular cuts are made in the cover or bottom of the can and the points turned up about the candle. The can may be bronzed, silvered, enameled or otherwise decorated, thus making it ornamental as well as useful.—Contributed by Mrs. A. M. Bryan, Corsicana, Texas.



How to Make a Match Holder of Wood and Metal

A very simple piece of art craft work is easily made, as follows: Secure a piece of paper and upon it draw the outline and design, as indicated in the



Match Holder

accompanying sketch. The size may be made to suit the taste of the worker. A good size is 5 in. wide by 6 in. long over all. The metal holder should be proportioned to this size, as shown.

Having completed the drawing, take a piece of thin wood, $\frac{3}{8}$ or $\frac{1}{4}$ in. thick, and trace upon it the design and outline, using a piece of carbon paper. A couple of thumb tacks should be used to fasten the paper and design in place. Put the tacks in the lines of the design so that the holes will not show in the finished piece. Any kind of wood will do. Basswood or butternut, or even pine, will do as well as the more expensive woods.

Next prepare the metal holder. This may be made of brass or copper and need not be of very heavy gauge—No. 22 is plenty heavy enough. The easiest way to get the shape of the metal is to make a paper pattern of the development. The illustration shows how this will look and the size of the parts for the back dimensioned above. Trace this shape on the metal with the carbon paper and cut it out by means of metal shears. Polish the metal, using powdered pumice and lye, then with a nail, punch the holes, through which small round-head brass screws are to be placed to hold the metal to the wood back. Carefully bend the metal to shape by placing it on the edge of a board and putting another board on top and over the lower edge so as to keep the bending true.

The wood back may be treated in quite a variety of ways. If soft wood, such as basswood or pine was used, it may be treated by burning with the pyrography outfit. If no outfit is at hand a very satisfactory way is to take a knife and cut a very small V-shaped groove around the design and border so as to keep the colors from "running." Next stain the leaves of the conventional plant with a little green wood dye and with another dye stain the petals of the flower red. Malachite and mahogany are the colors to use. Rub a coat of weathered oil stain over the whole back and wipe dry with a cloth. The green and red are barbarously brilliant when first put on, but by covering them at the same time the background is colored brown, they are "greyed" in a most pleasing manner. When it has dried over night, put a coat or two of wax and polish over the wood as the directions on the can suggest.

The metal holder may next be fastened in place.

If one has some insight in carving, the background might be lowered and the plant modeled, the whole being finished in linseed oil. If carving is contemplated, hard woods such as cherry or mahogany should be used.

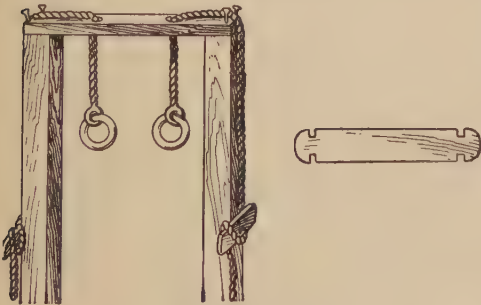
Protecting the Fingers from Chemicals

The finger nails and fingers may be easily protected from stains of chemicals by coating them with a wax made up as follows: Melt white wax in the same manner as melting glue. This may be done by cutting the wax into small pieces, placing them in a vessel and setting the vessel in boiling water. To each ounce of melted wax thoroughly stir in 1 dr. of pure olive oil. The fingers should be dipped into the wax while it is in a liquid state. This will form a coating that will permit the free use of the fingers, yet protects the skin from the chemicals. It is useful for photographers.

Combined Turning Rings and Swings

This trapeze, with rings for the large boys and a swing for the smaller ones, can be made on the same standards. Instead of the usual two short ropes, tied and bolted through the top cross-timber, bore two holes large enough for the ropes to pass through easily. Pass the rope along the crosspiece and down the post and tie it to cleats nailed at a height that can be easily reached.

At the ends of the crosspiece drive two nails, allowing them to project 1 or 2 in. This will keep the rope from slipping off when the rings and swing are raised and lowered. All sharp edges should be sandpapered to pre-

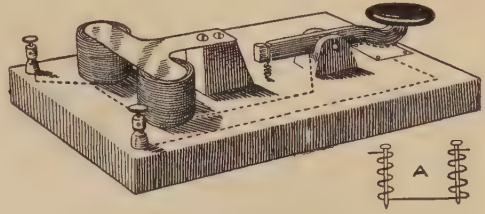


Rings and Swing

vent the rope from being cut. A board with notches cut in the ends will make a good swing board which can be removed instantly.—Contributed by W. A. Jaquythe, Richmond, Cal.

Homemade Telegraph Key

A piece of wood, $\frac{1}{2}$ in. thick, 2 in. wide and 5 in. long, is used for the base of this instrument. Two wire



Key and Connections

nails, each 1 in. long, are used for the cores of the magnets. Each nail is wound with three or four layers of fine insulated magnet wire, about No. 25 gauge, similar to that used in electric bells, leaving about $\frac{1}{4}$ in. of the end bare so that they may be driven into the wood base. The connections for the coils are shown in the sketch, at A.

About 1 in. behind the coils is fastened a small block of wood, the top of which is just even with the top of the nails in the coils. A piece of tin, cut in the shape of the letter T, is fastened with two screws to the top of this block, and the end bent slightly so as to clear the top of the nails about $\frac{1}{2}$ in.

The key lever is cut from a thin piece of wood, in the shape shown in the sketch, and pivoted in a slotted block which is used as a base for the key. A piece of bare copper wire is fastened along the under side of the key, as shown by the dotted lines. A rubber band, passing over the end of the key and attached to the base with a tack, acts as a spring to keep the key open. A small piece of tin is fastened to the base under the knob of the key. This is for making the contact between the copper on the key and the wires from the coils, when the key is pushed down.—Contributed by W. H. Lynas.

⌚ Bicycle trousers-guards make excellent sleeve bands when the cuffs are turned back and rolled above the elbows.

Imitation Arms and Armor—Part VII

The helmets, breastplates and gauntlets described in parts V and VI can be used in making up a complete model

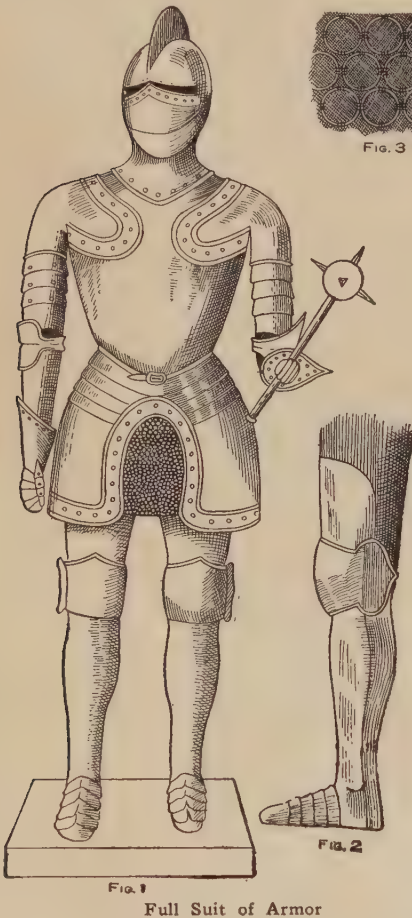


Fig. 1
Full Suit of Armor

for a full suit of armor of any size, as shown in Fig. 1. All of the parts for the armor have been described, except that for the legs. Figure 2 shows how the armor is modeled on the side of the left leg. The clay is modeled as described in previous chapters, the paper covering put on, and the tinfoil applied in imitation of steel. The chain mail seen between and behind the tassets is made by sewing small steel rings on a piece of cloth as shown in Fig. 3. These rings may be purchased at a hardware store or harness shop.

The whole figure when completed

is placed on a square box covered with red or green baize. The armor should be supported by a light frame of wood built up on the inside, says the English Mechanic, London. Two vertical pieces are firmly attached to the box so they will extend up inside the legs, and at the top of them is attached a crosspiece on which is placed a vertical stick high enough to carry the helmet. The two lower pieces must be built up and padded out with straw, then covered with red cloth or baize to represent the legs.

In making up the various pieces for a full model it will be found very convenient to use rope, a stout cord or strings in making up the patterns on the parts. Instead of using brass-headed nails, brass paper fasteners will be found useful. These can be purchased at a stationery store. Secure the kind having a round brass head from which hang two brass tongues. These are pushed through a hole and spread out flat on the opposite side. Other materials can be used in the place of tinfoil to represent steel. Silver paper will do very well, but if either the tinfoil or silver paper are found difficult to manipulate, go over the armor with a coat of silver paint put on with a brush. When dry give the surface a coat of varnish.

A Home-Made Tripod Holder

An inexpensive tripod holder, one that will prevent the tripod from slipping on a smooth floor, and prevent the points from doing damage to the polished surface or puncturing an expensive rug or carpet, can be made in a few minutes' time, says Camera Craft.

Secure two strips of wood, or ordinary plaster laths will do, and plane them down to a thickness of 3/16 in., for the sake of lightness. Cut them to a length of 40 in. and round off the ends to improve their appearance. Take the piece shown in Fig. 1 and

drill a $\frac{1}{4}$ -in. hole in the center, and eight small holes, 1 in. apart, at each end. In one end of the piece, Fig. 2, make the same series of eight small holes and, in the other end, drill six $\frac{1}{4}$ -in. holes, 3 in. apart. A $\frac{1}{4}$ -in. flat-headed carriage bolt, about 1 in. long, completes the equipment.

The two pieces are bolted together, not too tight, and the points* of the tripod legs inserted in their respective small holes. So set up, there is absolutely no danger of one of the legs slipping out of position. By moving the position of the bolt from one to another of the larger holes in the strip, Fig. 2, almost any desired inclination of the camera can be secured.

The same sort of simple apparatus built slightly stronger, and with a

small caster under each of the three series of small holes, makes an excel-

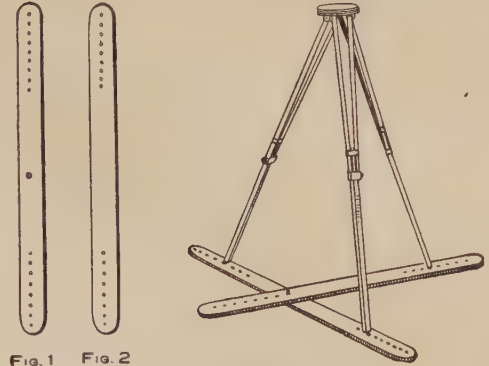


Fig. 1 Fig. 2 The Tripod Cannot Slip

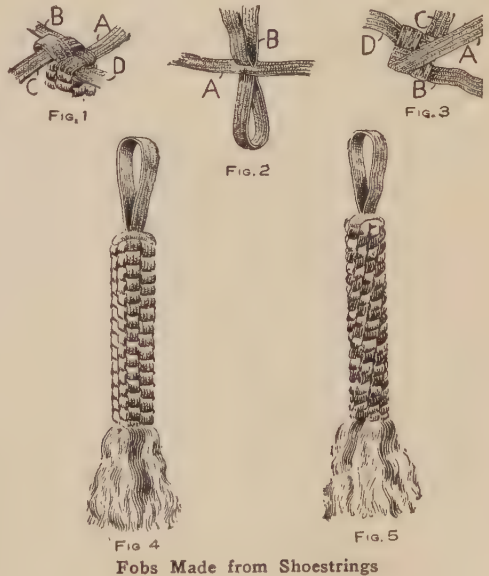
lent tripod clamp for use when the camera has to be shifted about, as in portraiture and the like.

How to Weave a Shoestring Watch Fob

Having procured a pair of ordinary shoestrings, take both ends of one of them and force the ends through the middle of the other, leaving a loop $1\frac{1}{2}$ in. long, as shown in Fig. 2. In this sketch, A is the first string and B is the second, doubled and run through the web of A. Take hold of the loop and turn it as shown in Fig. 2, allowing the four ends to hang in four directions. Start with one end, the one marked A, in Fig. 1, for instance, and lay it over the one to the right. Then take B and lay it over A, and the one beneath C; lay C over B and the one under D, and then lay D over C and stick the end under A. Then draw all four ends up snugly. Commence the next layer by laying the end A back over B and D; D over A and C; C over D and B, then B over C and the end stuck under A. Proceed in the same manner and keep on until about $1\frac{1}{2}$ in. of the ends remain unwoven. Four pins stuck through each corner and into the layers will hold the ends from coming apart. The ends of the strings are raveled out so as to make a tassel. This will make a square fob

which will appear as shown in Fig. 4.

A round fob is made in a similar way, taking the same start as for the square fob, but instead of reversing



Figs. 4 and 5 Fobs Made from Shoestrings

the ends of each alternate layer, always lap one string, as at A in Fig. 3, over the one to its right, as B, slipping

the last end of the four strings under and tightening all, as in making the square fob. Fasten the ends with pins and ravel out for a tassel. The round fob is shown in Fig. 5.

A fob in the shape of a horseshoe can be made by taking four shoestrings and tying a small string around the middle of them, then weaving the layers both ways from the point where the strings are tied. A loop, $1\frac{1}{2}$ in. long, is left out at the center before

starting on one side. The loop is for attaching the fob to the watch. After the weaving is complete and the tassel ends made, a small stiff wire is forced through the center to form the shape of a horseshoe.

Other designs can be made in the same manner. Strings of different colors will make up a very pretty fob, especially if silk strings are used.—Contributed by John P. Rupp, Monroeville, Ohio.

How to Make a Table Mat of Leather

The table mat, the design of which is shown herewith, is to be made of leather. It may be made of Russian calf and the background modeled down



Pattern for the Table Mat

as has been described in several previous articles dealing with leather work. To do this the leather is moistened on the back side just enough to make the leather take the impression of the tool, but not enough to make the moisture show through on the face. Any smooth piece of steel, such as a nut pick, that will not cut or scratch the leather and will make a V-shaped depression will do.

A second method is to secure a piece of sheepskin and, using the reverse

side, outline the design by means of a pyrographer's outfit. This manner of treating leather is so common that it needs no description.

A third method is to secure a piece of sheep or goat skin, trace the design on the reverse side by means of carbon paper, and put the outline and design in with brush and stains such as are sold for this purpose.

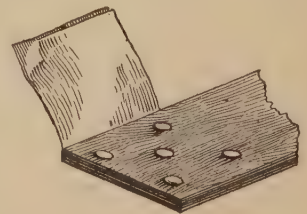
The accompanying pattern shows but one-fourth of the mat. Draw the one-fourth on paper to the size desired and then fold on lines A and B, tracing this one-fourth on the other parts by the insertion of double-surfaced carbon paper.

On the calfskin the pattern is to be held on the leather and the tool worked over the pattern to get the outline transferred. After this the pattern is to be removed and the leather modeled.

Sad Iron Polisher

A small amount of wax is necessary on an iron for successful work. The wax is usually applied by hand to the heated surface of the iron.

A much better and handier way is to bore five or six holes in one end of the ironing board to a depth of half



its thickness, filling them with wax, beeswax or paraffin, and covering them over with two thicknesses of muslin.

The rubbing of the hot iron over this cloth absorbs just enough of the wax to make the iron work smoothly. When the supply of wax is exhausted, it can be easily renewed.—Contributed by A. A. Houghton, Northville, Mich.

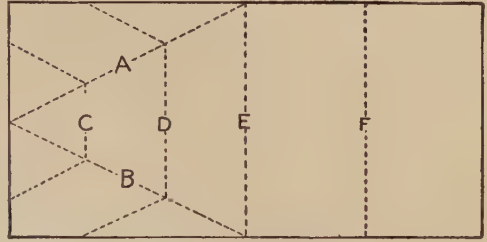
Making Coins Stick to Wood by Vacuum

Take a quarter and place it flat against a vertical surface of wood such as the side of a book-case, door facing or door panel, and strike it hard with a downward sliding motion, pressing it against the wood. Take the hand away and the coin will remain on the woodwork. The striking and pressure expel the air between the quarter and the wood, thus forming a vacuum sufficient to hold the coin.



Simple and Safe Method for Sending Coins by Mail

Sending coins by mail is not as a rule advisable, but sometimes it be-



How the Paper is Folded

comes necessary, and usually a regular coin mailer is not available. A very simple and secure way to wrap a coin or coins for mailing is as follows: Procure a piece of heavy paper, nearly as wide as the envelope is long, and about 12 in. long. Fold on the dotted lines shown by A and B in the sketch, and slip the coin in the pocket thus formed. Fold together on lines C, D, E and F, making the last two folds wide enough to fit snugly in the envelope. This method holds the coin in the center of the envelope where it cannot work around and cut through the edges.—Contributed by O. J. Thompson, Petersburg, Ill.

Mounting Photographs in Plaster Plaques

Purchase a few pounds of plaster of paris from your local druggist and select a dish of the desired shape in which to make your cast. The size of the dish will depend on the size of the print to be mounted. Select the print you wish to mount, those on matte paper will work best, and after wetting, place it face down in the dish, press into place and remove all drops of water with a soft cloth. Be sure and have the print in the center of the dish. Earthen dishes will be found more convenient, although tin ones can be used with good success, says Photographic Times.

Mix some of the plaster in clear

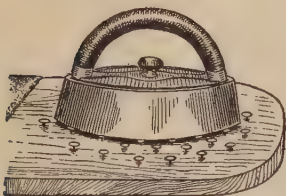
water so it will be a little thick. Enough plaster should be mixed to cover the bottom of the dish about $\frac{1}{2}$ in. thick. Pour the plaster into the dish over the print and allow to stand until it becomes quite hard. The cast can then be removed and the print should be fast to it. If the print or plaster is inclined to stick, take a knife and gently pry around the edges and it can be removed without breaking.

Prints of any size may be used by having the mold or dish large enough to leave a good margin. This is a very important point as it is the margin that adds richness to all prints. Platinum or blueprint papers work well, but any

kind that will not stick may be used. After the plaster has thoroughly dried, any tint may be worked on the margin by the use of water colors; if blueprints are used, it is best to leave a plain white margin.

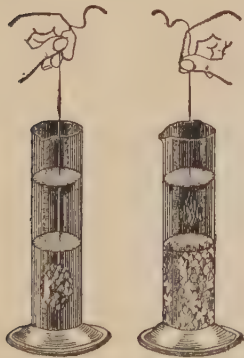
Iron Rest for an Ironing Board

A flatiron rest can be made on an ironing-board by driving a number of large tacks into one end of the board. The tacks should be about 1 in. apart and driven in only part way, leaving about $\frac{1}{4}$ in. remaining above the surface of the board. The hot iron will not burn the wood and it cannot slip off the tacks. This iron rest is always with the board and ready when wanted.—Contributed by Beatrice Oliver, New York, N. Y.



Instantaneous Crystallization

Dissolve 150 parts of hyposulphite of soda in 15 parts of water and pour the solution slowly into a test tube which has been warmed in boiling water, filling the same about one-half full. Dissolve in another glass 100 parts of acetate of soda in 15 parts of boiling water. Pour this solution slowly on top of the first in such a way that it forms an upper layer, without mixing the solutions. The two solutions are then covered over with a thin layer of boiling water and allowed to cool.



Lower into the test tube a wire, at

the extremity of which is fixed a small crystal of hyposulphite of soda. The crystal traverses the solution of acetate without causing trouble, but crystallization will immediately set in as soon as it touches the lower hyposulphite of soda solution, as shown at the left in the sketch.

When the hyposulphite of soda solution becomes crystallized, lower in the upper solution a crystal of acetate of soda suspended by another wire, as shown in the right of the sketch, and this will crystallize the same as the other solution.

Decoloration of Flowers by Fumes of Sulphur

Dissolve some sulphur in a small dish which will inflame by contact with air thus forming sulphuric acid fumes. Cover the dish with a conical chimney made of tin and expose to the upper opening the flowers that are to be decolorized. The action is very rapid and in a short time myrtle, violets, bell flowers, roses, etc., will be rendered perfectly white.

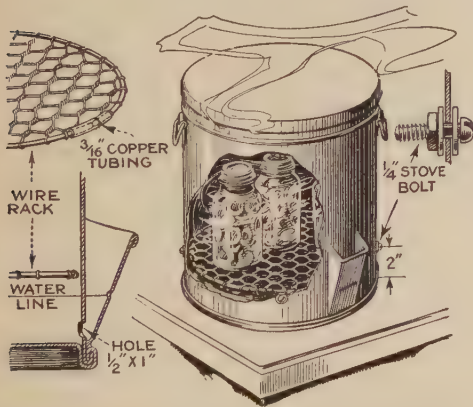


How to Preserve Egg Shells

Many naturalists experience difficulty in preserving valuable egg shells. One of the most effective ways of preserving them is as follows: After the egg is blown, melt common beeswax and force it into the shell with a discarded fountain pen filler. Set in a cool place until the wax hardens. The most delicate shells treated in this manner can be handled without fear of breaking, and the transparency of the wax will not alter the color, shading, or delicate tints of the egg.—Contributed by L. L. Shabino, Millstown, South Dakota.

A Lard-Can Steam Cooker

A low-pressure steam cooker can be made at home out of a 45-lb. tin lard can. Those made out of black iron cannot be used. Select one in good shape, with a tight-fitting lid. Take a clean tomato can about No. 2 or 3 size to make the water filler and gauge. This is easily shaped and soldered to the lard can as shown. If you wish to use two packs, you need eight $\frac{3}{16}$ or $\frac{1}{4}$ -in. stove bolts, 1 in. long, and sixteen washers. The first row of bolts is evenly spaced around the can, 2 in. from the bottom, measuring on the outside of the can. Put them in as shown in the detail and solder the washers and bolt heads to the can. Make one or two jar racks, as shown, using No. 9 wire for the rim, and $\frac{3}{16}$ -in. copper tubing to make a neat joint. Solder the ends together. Use square-mesh galvanized cloth or netting, twisting the wires onto the rim so that there will be no sag. The wire hoops for the rack should be about 1 in. smaller than the inside of the lard can. If you wish to use pints when canning, make two racks. The water line should be about $\frac{1}{4}$



Low-Pressure Steam Cooker Made from Forty-Five-Pound Lard Can

to $\frac{1}{2}$ in. below the bottom of the jars. If the bottom of the lard can should leak, solder it all around the inside of the seam. Cut a $\frac{1}{2}$ by 1-in. hole about $\frac{1}{4}$ in. from the bottom before soldering on the water gauge.—Geo. H. Cappel, Wilmer, Ala.

Always mix starch with soap water; this will prevent the iron from sticking and will give the linen a higher gloss.



Lightweight Mute for Trombone

Trombone players will find the lightweight mute shown in the drawing of considerable value. It is made of felt of any color, although green has been found especially well suited for this purpose. The bell on my trombone is 7 in. in diameter, so I made the mute 8 in. across and of two thicknesses. Draw a circle, 12 in. in diameter, on a piece of felt and out of this disk make the rim that holds the mute in place on the bell. This strip is 2 in. wide and runs two-thirds of the way around the bell. Sew the outside of the rim to the outside of the center piece. When finished, the rim will stand out cone-shaped. The practicing musician will find this an ideal mute.—Irvin L. Oakes, Pleasant Hill, Ohio.

Spectacles Make Magnifying Glass

An old pair of spectacles can be changed to form a small magnifying glass, which is generally useful. The two eye wires are bent so that they are parallel, and exact focus is obtained by bending the nose piece so that the glasses can be pulled apart or brought together for more or less magnification.



A Novel Rat Trap

A boy, while playing in the yard close to a grain house, dug a hole and buried an old-fashioned fruit jug or jar that



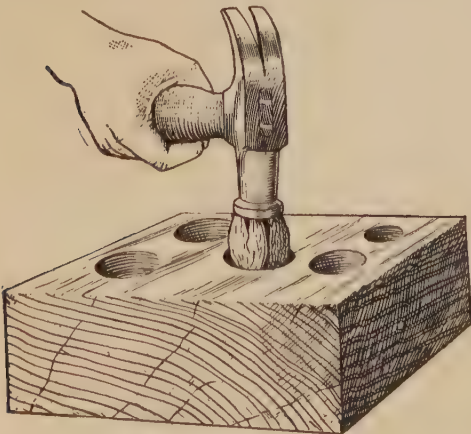
his mother had thrown away, says the Iowa Homestead. The top part of the jug was left uncovered as shown in the sketch, and a hole was broken in it just above the ground.

The boy then placed some shelled corn in the bottom, put a board on top, and weighted it with a heavy stone.

The jug had been forgotten for several days when a farmer found it, and, wondering what it was, he raised the board and found nine full-grown rats and four mice in the bottom. The trap has been in use for some time and is opened every day or two and never fails to have from one to six rats or mice in it.

A Nut-Cracking Block

In the sketch herewith is shown an appliance for cracking nuts which will prevent many a bruised thumb. To

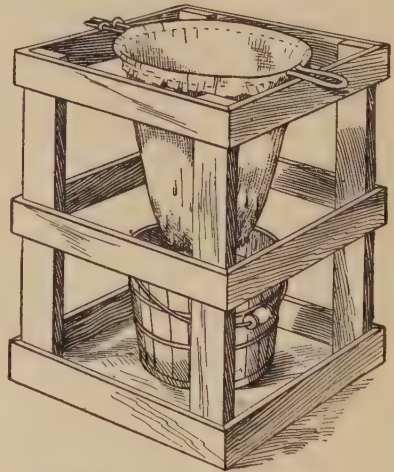


Holes in Block for Nuts

anyone who has ever tried to crack butternuts it needs no further recommendation. The device is nothing more than a good block of hardwood with a few holes bored in it to fit the different sized nuts. There is no need of holding the nut with the fingers, and as hard a blow may be struck as desired. Make the depth of the hole two-thirds the height of the nut and the broken pieces will not scatter.—Contributed by Albert O'Brien, Buffalo, N. Y.

A Jelly-Making Stand

Every housewife who makes jelly is only too well acquainted with the inconvenience and danger of upsets when using the old method of balancing a



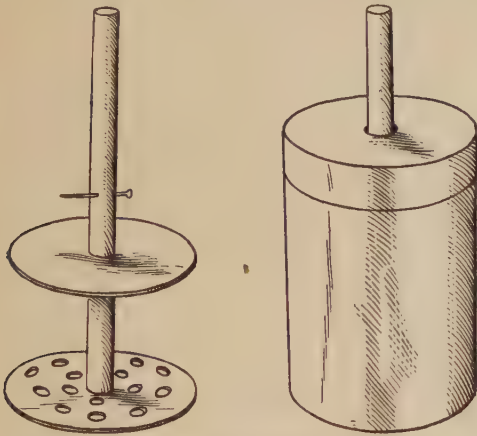
Cheesecloth Strainer on Stand

jelly-bag on a couple of chairs stood on the kitchen table, with the additional inconvenience of having a couple of chairs on the kitchen table out of commission for such a length of time.

The accompanying sketch shows how a stand can be made from a few pieces of boards that will help jelly makers and prevent the old-time dangers and disadvantages. The stand can be stood in the corner of the kitchen, or under the kitchen table where it will be out of danger of being upset.—Contributed by Lyndwode, Pereira, Ottawa, Can.

How to Make an Egg-Beater

There is no reason why any cook or housewife should be without this egg-beater, as it can be made quickly in any size. All that is needed is an ordinary can with a tight-fitting cover—a baking-powder can will do. Cut a round piece of wood 3 in. longer than the length of the can. Cut a neat hole in the cover of the can to allow the stick to pass through, and at one end of the stick fasten, by means of a flat-headed tack, a piece of tin, cut round, through which several holes have been punched. Secure another piece of heavier tin of the same size, and make



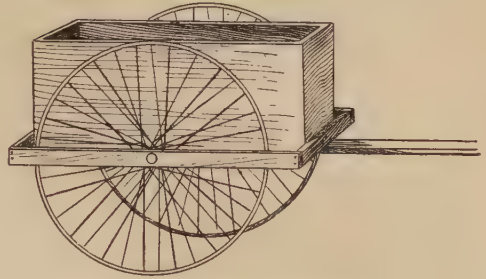
Made Like a Churn

a hole in the center to pass the stick through. Put a small nail 2 in. above the end of the dasher, which allows the second tin to pass up and down in the opposite direction to the dasher. This beater will do the work in less time than the regular kitchen utensil.—Contributed by W. A. Jaquythe, Richmond, Cal.

Cart Without an Axle

The boy who has a couple of cart wheels is not always lucky enough to have an axle of the proper length to fit the wheels. In such a case the cart can be constructed as shown in the illustration. This cart has no axle, each wheel being attached with a short pin for an axle, on the side and at the lower edge of the box. The outer end of the

pin is carried on a piece of wood extending the full length of the box and



Wheels Fastened to the Box

supported by crosspieces nailed to the ends, as shown.—Contributed by Thos. De Loof, Grand Rapids, Mich.

An Illuminated Target

My youthful nephews some time ago were presented with an air rifle and it worked so well that it became necessary for me to construct a target that would allow the fun to be carried on at night.

I reversed a door gong, screwed it on the inside of a store box, and fitted two candles on the inside to illuminate the bullseye. The candles, of course, were below the level of the bullseye. The position of the candles and gong are shown in Fig. 1. At night the illuminated interior of the bell could be



FIG. 1

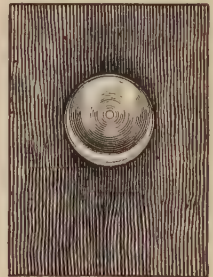


FIG. 2

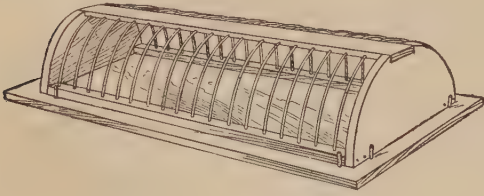
Target for Night Shooting

plainly seen as shown in Fig. 2.—Contributed by James M. Kane, Doylestown, Pa.

⌈Sheet metal placed between two boards in the jaws of a vise and clamped tightly, can be sawed easily with a hacksaw.

Feed Box for Chickens

The sketch shows the construction of a feed box designed to prevent the scattering of feed and give the coward

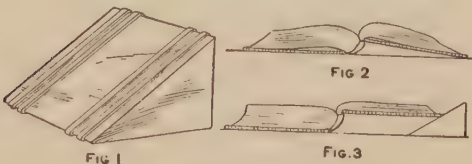


Chicken Feed Box

rooster as much chance to fatten as the game cock. The base may be made of a $\frac{1}{2}$ -in. board, 1 ft. wide and 3 ft. long, although any of the dimensions may be varied to suit special requirements. The ends are semi-circular pieces with a notch, $\frac{1}{4}$ in. deep and 3 in. wide, cut in the center of the rounding edge. The ends are connected together with a piece of wood set in the notches. The strip of wood is $\frac{1}{4}$ in. thick, 2 in. wide and as long as the box. Notches $\frac{1}{8}$ in. wide and $\frac{1}{8}$ in. deep are cut on the under side of this piece of wood, $1\frac{1}{2}$ in. apart. Heavy pieces of wire are bent in the form of a semi-circle, as shown. The wires are set in the $\frac{1}{8}$ -in. notches cut on the under side of the top piece of wood. The ends of the wires are set in holes in wood pieces joining the bases of the end pieces. The baseboard and top are separable.—Contributed by Maurice Baudier, New Orleans, La.

A Book Rest

A book that does not open flat is rather inconvenient to write in when one of its sides is in the position shown in Fig. 2. A wedge-shaped piece of



Book Back Holders

metal, stone or wood, as shown in Fig. 1, will, when placed as in Fig. 3, raise the sloping half to the level of the other pages. Cover the block with rubber, wide rubber bands or felt, to prevent its scratching the desk top. The block can also be used as a paperweight.

Window Shelf for Flower Pots

On the ledge formed by the top part of the lower sash of the window I fitted a board 7 in. wide into each side of the casing, by cutting away the ends. I placed a small bracket at each end of the shelf, so that it would fit solidly against the lower window sash to support the weight of the plants.



Shelf in Window

One of the brackets I nailed to the shelf and the other I held in place with a hinge, the reason being that if both were solid, the shelf could not be put on the window, as one end must be dropped in place before the other. Such a shelf will hold all the plants a person can put on it. When not in use, it can be removed without marring the casing.—Contributed by G. A. Wood, West Union, Ia.

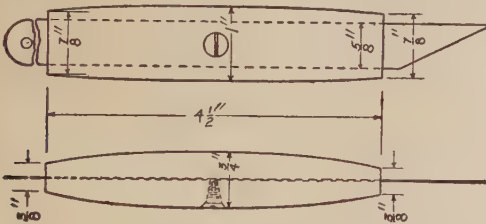
Magnet for the Work Basket

Tie a ribbon or strong string to the work basket and fasten a large magnet to the other end. Needles, scissors, etc., can be picked up without any trouble. This device is very convenient for invalids.—Contributed by Nellie Conlon, Worcester, Mass.

Knife Made from a Hack-Saw Blade

A very serviceable knife with excellent cutting qualities can be made easily from a discarded hack-saw blade. The dimensions given in the sketch make a knife of convenient size.

The saw teeth are ground off on an emery wheel or grindstone to a smooth edge parallel with the back edge. For the handle, take two pieces of hard wood, dressing one surface of each piece, and cut a groove as wide and thick as the saw blade. Place the blade in the groove and glue the two dressed sides of the wood together. After the glue has dried, the blade can be pulled out of the groove and the wood shaped to any desired form. A small wood-screw is put through one side of the handle to prevent the blade from sliding. After completing the



Details of Handle

handle, the blade is put back into the groove and sharpened to a cutting edge.—Contributed by H. A. Hutchins, Cleveland, Ohio.

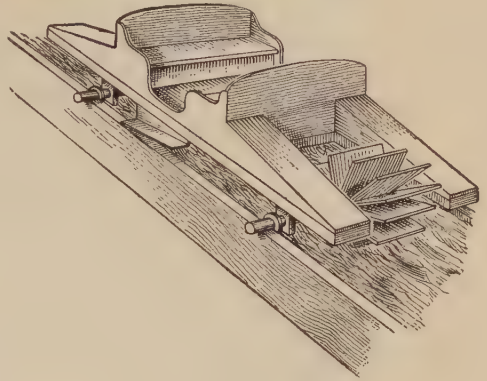
Killing Mice and Rats

A simple and inexpensive means for killing mice and rats is to leave yeast cakes lying around where they can eat them.—Contributed by Maud McKee, Erie, Pa.

Roller Coaster Illusion Traveling Up an Incline

A toy car with a paddle wheel and a shaft on both ends traveling upward on a chute in which water is flowing down, is shown in the accompanying sketch. The paddle wheels travel in a reverse direction causing the ends of the axles to roll on the edge of the

chute, thus carrying the car up the incline. If a rack is used on each side of the chute and a small pinion on the



Car Travels Uphill

ends of the axles, a positive upward movement of the car will be obtained.—Contributed by W. S. Jacobs, Malden, Mass.

Block for Planing Octagonal Wood Pieces

The little device shown in the illustration will be found very useful in any workshop. Two or three of them will be necessary for planing long pieces. Each one is made of a hardwood block, 1 in. square and 4 in. long. A notch is cut in one side, as shown in Fig. 1, so a piece of wood which has been planed square will fit in it. Put a screw in the end of each piece and fasten it down to the bench. If desired, a tenon may be made on the bottom of each block, as shown in Fig. 2, to fit a mortise cut in the bench. Place the blocks far enough apart so the board to be planed will rest firmly in the notches.

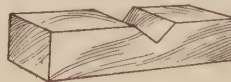


FIG. 1



FIG. 2

The Notch Holds the Wood

Plane the board square first and then place it in the notches and plane the corners down to the proper dimensions.—Contributed by Willie Woolsen, Cape May Point, N. J.

A Letter Holder of Pierced Metal

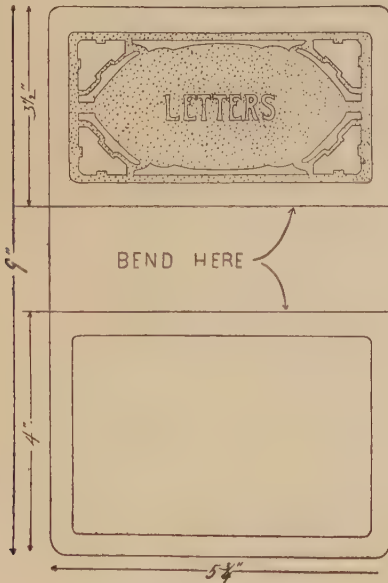
The letter holder shown in the illustration will be found convenient for holding out-going letters that await the postman's coming. It can be made of either copper or brass and need not



Finished Letter Holder

be of very heavy material. Gauge 22 will be sufficiently heavy. One sheet of metal, 6 by 9½ in., a board on which to work it, and an awl and hammer, will be needed.

Prepare a design for the front. If one such as is shown is to be used,



Layout for the Metal

make one-quarter of it first, and then get the other parts by folding on the center lines and tracing. This will in-

sure having all parts alike. The letters can be put on afterward.

Fasten the metal to the board, using tacks and nailing outside of the required space, in the waste metal. Trace the design on the metal with carbon paper; or, if desired, paste the paper design right on the metal. With an awl pierce the metal between the marginal line and the design, as shown. The holes should be uniform along the outlines but should be pierced promiscuously otherwise. On the back, only the marginal line is to be pierced.

Remove the metal, together with the paper if the latter was pasted to the metal, and trim off the surplus metal where the tacks had been placed. File off any sharpness so that the hand may not be injured in handling it. Place the metal on the edge of a table or between two boards, and bend on the two lines indicated in the drawing, to right angles.

A good finish is obtained by just letting the copper age with its natural color. If any polishing is required, it should be done before the metal is fastened to the board and pierced.

Imitating Ground Glass

Make a mixture of white lead in oil, 1 part; varnish, ¾ part; turpentine, ¼ part, and add sugar of lead as a dryer. Make a very thin paint of this and use a broad, flat brush, says Master Painter. With care you may succeed in getting the paint on quite evenly all over, which is desirable. One coat will do. If it becomes necessary to remove this coating for renewal, it may be effected by an application of potash lye, or the old may be renewed by a coating of a mixture of 2 parts hydrochloric acid, 2 parts white vitriol, 1 part sulphate of copper (blue vitriol) and 1 part of gum arabic, applied by means of a brush.

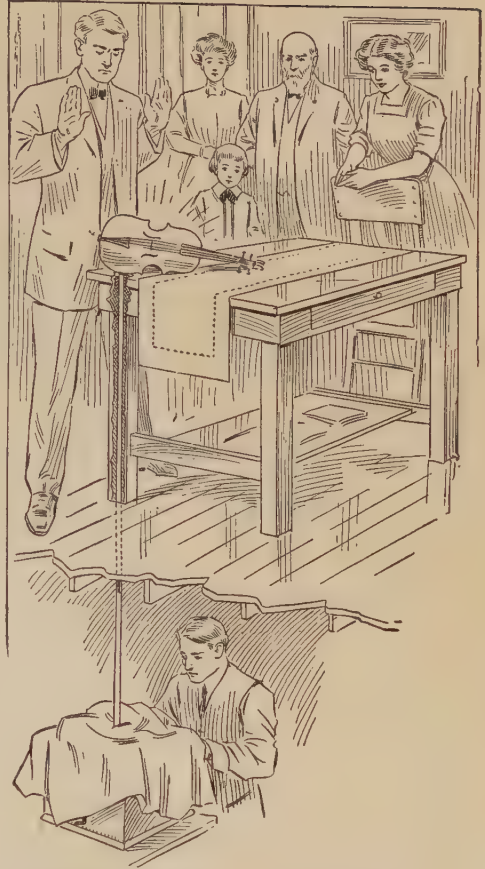
CA detail drawing made of a piece of furniture before starting the work will often save time and mistakes.

Making "Spirits" Play a Violin

A very pretty trick, that can be worked in your own parlor, will produce as much sensation as a fake "medium." In all appearance, a violin, mandolin or guitar, placed on a table, will begin to produce music simply through stamping the foot and a few passes of the hand. The music will not sound natural, but weird and distant.

The trick is done by placing the end of a small stick on a music box in the basement of the house and allowing the other end to pass up through the floor and table top so it will project about $\frac{1}{8}$ in. The stick may be placed by the side of, behind or through the center of a table leg. Be careful not to have any obstruction in the way of the stick. The instrument is placed sideways on the protruding end of the stick. The "fake" work of invoking the "spirit" is performed and ended by stamping the foot, which signals the operator in the basement to start the machine, and the violin seemingly produces music without anyone touching it.

So impressive are the results, that many people really think the spirits of the departed are playing the violin with unseen hands. The music is transmitted through the stick from the music box to the violin.



The Music Produced by the Phonograph is Transmitted to the Violin on the Second Floor by the Aid of a Long Stick

Sizing a Threaded Hole

It sometimes becomes necessary to transfer the size of a threaded hole from some out-of-the-way place to the shop in order to make a piece to fit it. With proper tools this is easy; without them, it might be difficult. One thing is always at hand and that is wood. Whittle a stick tapering until it starts in the hole. Then turn it into the hole and a fair thread will be made on the wood. The stick can be carried in the pocket without risk of changing the size, as would be the case with ordinary calipers.

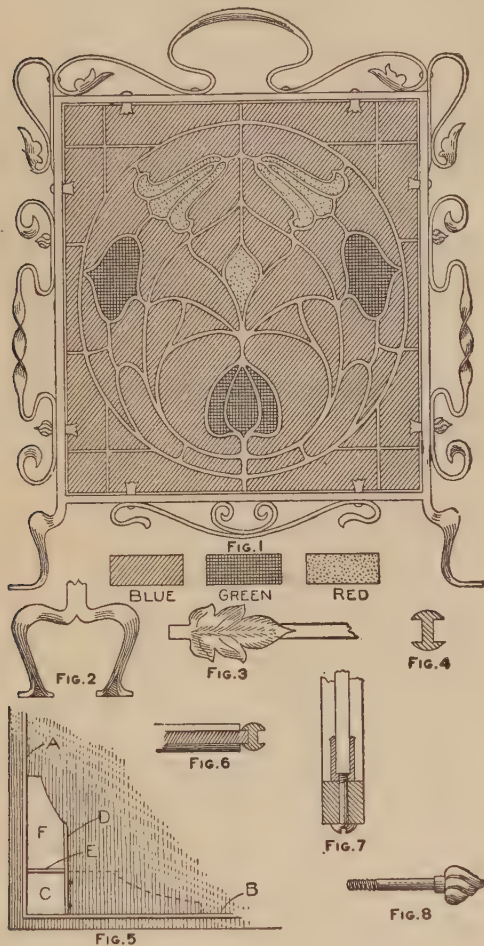
Leaded-Glass Fire Screen

The main frame of the fire screen shown in Fig. 1 is made from two pieces of $\frac{1}{2}$ -in. square bar iron. The longest piece, which should be about $5\frac{1}{2}$ ft. long, is bent square so as to form two uprights, each 28 in. long and measuring 26 in. across the top. The bottom crosspiece can be either riveted or welded to the uprights. Two pairs of feet, each 6 in. long and spread about 8 in. apart, are shaped as shown in Fig. 2. These are welded to the lower end of the uprights.

The ornamental scrollwork on the

frame is simple and effective, and is easy to construct, says Work, London. The scrolls are attached to the frame by means of $\frac{3}{16}$ -in. round-head machine screws. The leaf ornament at the ter-

mination of the scroll is shaped and embossed as shown in Fig. 3. The metal used for the scrolls is $\frac{3}{16}$ in. thick by $\frac{1}{2}$ in. wide. The leaf ornament is formed by turning over the end of a piece of metal and working it together at a welding heat, and then shaping out the leaf with a chisel and files, after which they are embossed with a ball-peen hammer.



Completed Fire Screen and Parts

mination of the scroll is shaped and embossed as shown in Fig. 3. The metal used for the scrolls is $\frac{3}{16}$ in. thick by $\frac{1}{2}$ in. wide. The leaf ornament is formed by turning over the end of a piece of metal and working it together at a welding heat, and then shaping out the leaf with a chisel and files, after which they are embossed with a ball-peen hammer.

The center is made from colored glass of special make for leaded work. The design is formed in the lead, of

which a cross section is shown in Fig. 4. Use care to give the lead a symmetrical outline. The design should be drawn full size on a large sheet of heavy paper and the spaces to be occupied by the lead cut out so as to leave the exact size and shape of each piece of paper the same as wanted for each piece of glass. These are used as patterns in marking the glass for cutting. The glass is cut the same as ordinary window glass. The glass, lead, border and special flux can be purchased from an art glass shop.

After the glass is cut, the work of putting the pieces together with the lead between them is begun. Secure a board as wide as the screen—several narrow boards put together will do—and begin by placing one vertical side border, A, Fig. 5, and the base border, B, on it as shown. Place the corner piece of glass, C, in the grooves of the borders, cut a long piece of lead, D, and hold it in place with two or three brads or glazier's points. The piece of lead E is cut and a small tenon joint made as shown in Fig. 6. While the piece of lead D, Fig. 5, is held by the brads, the piece E can be fitted and soldered. The soldering is done with a hot soldering iron and wire solder, using rosin as a flux, or, better still, special flux purchased for this purpose. After the joints are soldered, the piece of glass F is put in place and the lead held with brads as before until the cross leads are fitted and soldered. The brads are then removed, the glass piece as shown by the dotted lines put in, and the leads around it held with brads until the crosspieces are put in and soldered. This method is pursued until the glass is complete, then the two remaining vertical and top pieces of border are put on and all corners soldered.

The leaded glass is held in the iron frame by means of eight U-shaped clips, as shown in Fig. 7. A hole is drilled in the frame for the retaining screw, the latter being tapped to the base of the clip. Special screws may be made with ornamental heads, as shown in Fig. 8, and used for securing the side scrolls and clips together.

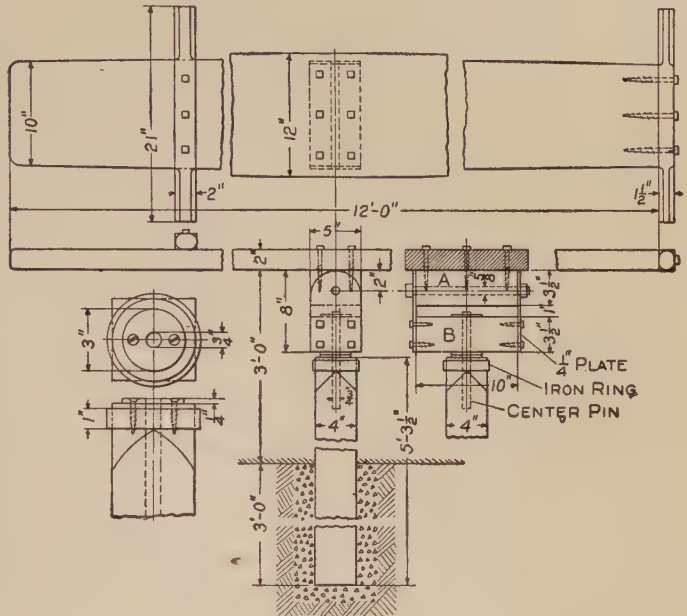
A Revolving Teeter Board

The accompanying sketch shows the details of a revolving teeter board for the children's playground that can be constructed in a few hours. Secure a post, not less than 4 in. square and of the length given in the drawing, and round the corners of one end for a ring. This ring can be made of 1-in. strap iron and it should be shrunk on the post. Bore a $\frac{3}{4}$ -in. hole in the end of the post for the center pin to rest in. Make three washers 3 in. in diameter and $\frac{1}{4}$ in. thick and drill $\frac{3}{4}$ -in. holes through their centers. Drill and counter-sink two smaller holes for 2-in. wood screws in each washer. Fasten one of these washers to the top of the post as shown. The post is now ready to be set in the ground. Coarse gravel should be packed tightly about it to make it solid. Concrete is much better if it can be secured.

To make the swivel you will need two $\frac{1}{4}$ by 5 by 8-in. plates, rounded at the top as shown, and two wood blocks A and B, each $3\frac{1}{2}$ by 5 by 10 in. Drill the lower ends of the plates for four $2\frac{1}{2}$ -in. lag screws and the upper ends for a $\frac{5}{8}$ -in. bolt. Fasten the plates to the block B, then drill a $\frac{3}{4}$ -in. hole as shown and fasten the two remaining washers to the block, one on each side and central with the hole. Bore a $\frac{5}{8}$ -in. hole lengthwise through the block A for the $\frac{5}{8}$ -in. rocker bolt. This bolt should be $11\frac{1}{2}$ in. long.

The teeter board is made of a 2 by 12-in. plank about 12 ft. long. It should be slightly tapered from the center to the ends. Two styles of hand holds are shown, but the one on the left is the one most generally used. The handles are rounded at the ends and

are fastened to the board with lag screws or bolts. The block A is fastened to the board with lag screws and should be a working fit between the



Details of Teeter Board

two plates where it is held by means of the $\frac{5}{8}$ -in. bolt. The center pin is $\frac{3}{4}$ in. in diameter and about 9 in. long.—Contributed by W. H. Dreier, Jr., Camden, N. J.

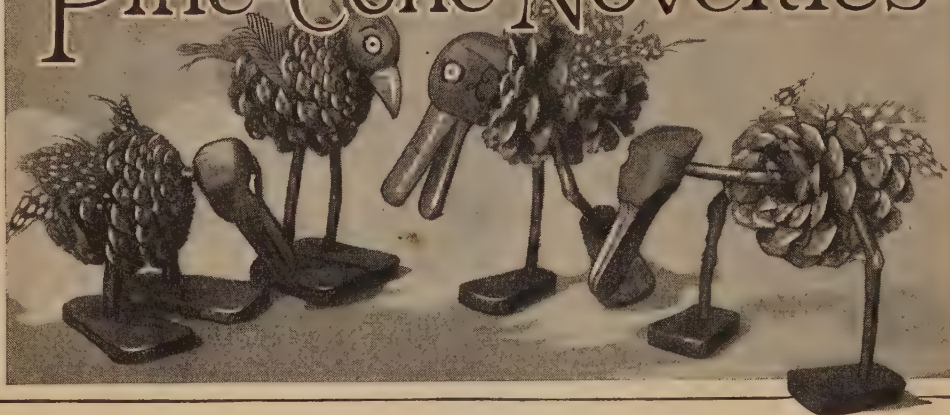
Home-Made Pot Covers

Empty thread spools and the tins used as extra inside covers in lard cans are usually thrown away, but these can be put to good use as kettle covers, if they are made up as fol-



lows: Saw the spool in half as shown, make a hole in the center of the tin and run a screw or nail through the spool and the tin; then flatten its end on the under side. This will make an excellent cover for a pot.—Contributed by Maurice Baudier, New Orleans, La.

You Can Make These Pine-Cone Novelties



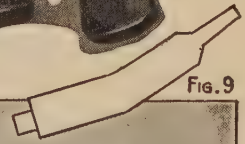
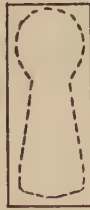
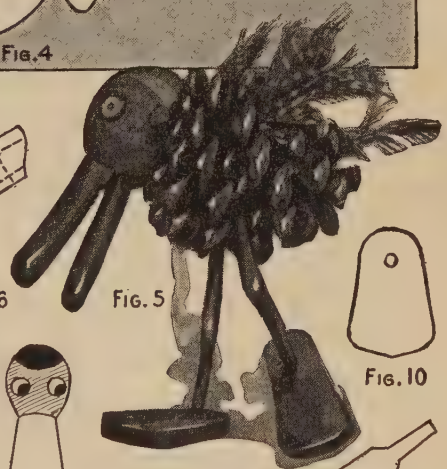
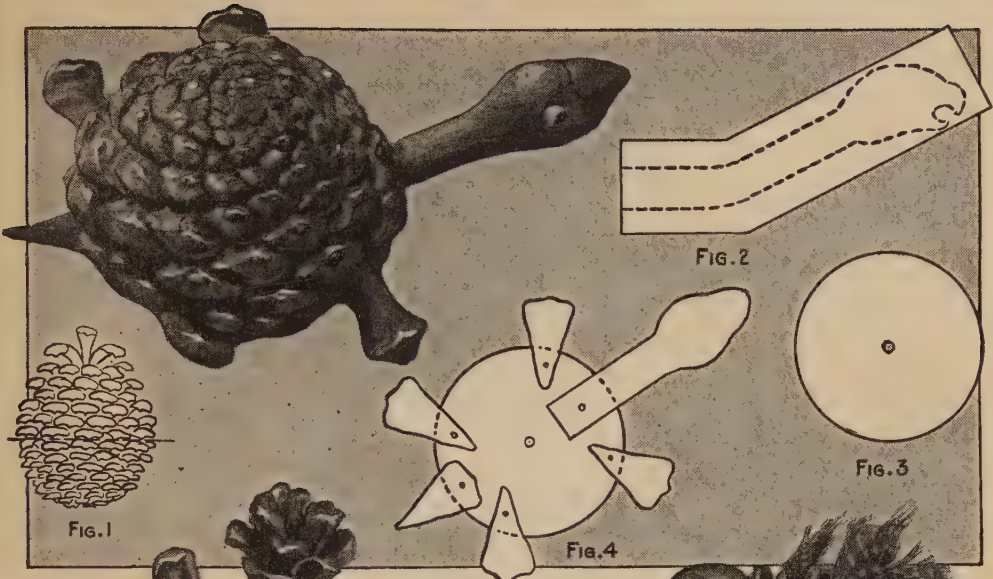
By F. W. WEST

ATTRACTIVE or grotesque birds and other novelties can easily be made from pine cones by anyone possessing a little skill and ingenuity. Besides the cones, all the material needed is some sticks, twigs, feathers and paint. No particular sizes are given, as they must depend on the size of the cones and upon the effect one wishes to obtain.

A general idea of the birds may be obtained from the headpiece, and Figs. 5, 6, 7, 8, 9 and 10, which show the details. The heads are most easily made from small forked pieces, which should be at least 1 in. in diameter after the bark is removed. The painting may be done with oil paint, water colors or lacquer. The latter is easily applied and dries quickly. Two brushes are needed, one a No. 1 camel's-hair brush for the eyes and for striping, and a No. 3 brush for the other work. The eyes should be painted first, preferably black. Fill in with green around them, as indicated in Fig. 8. Next paint the top of the head, using red. The light part of the beak is yellow. Then, with the small brush, make a black stripe down the sides of the beak to divide the lower and upper part. The appearance can be improved by separating each color with a stripe of black. White pine or other soft wood is most suitable for the legs and feet.

To assemble the birds, attach the legs to the cone first. Take two small twigs of any length and size desired, shave one end of each down thin (Fig. 9) and apply a little glue. Then insert the legs between the scales near the stem end and, after the glue has set, trim the legs to the desired length, shaving off the lower end to fit in holes drilled in the feet, which should be about $\frac{1}{4}$ in. thick, and attach with glue. To fasten the head, drill a small hole in the stem end of the cone, shave the end of the neck to fit and attach it with glue. Finally glue a small feather to each side of the cone to represent wings, and one or two feathers in the end for a tail, and the bird is complete.

The turtle (Figs. 1 to 4) should be made from a well-formed cone with the scales at the stem end intact. This end is cut off and forms the back shell. Drill a small hole through the center where the stem was removed. The under shell, Fig. 3, is cut from $\frac{1}{4}$ -in. wood, just large enough so that the back covers it. The hole in the center is the same size as the hole in the back. Paint the beak and the eyes olive and black, respectively, and the other parts of the head and neck to match the natural color of the shell. The assembling is easy. The legs and tail are scales taken from another cone and are attached with



glue and a small brad or pin, as indicated. The head is fastened in the same way. To joint the back and bottom shell, use a small wooden dowel or pin, fitting tightly in the holes in these parts. Fasten with glue, squeezing or clamping them until the glue has set. Then trim the dowel flush with the bottom and back, and paint the ends the same color as the head. This completes the turtle.

Artificial flowers made from cone parts are shown in Fig. 11. To make them, cut the cones in two pieces of about equal length. For larger flowers remove a few of the foremost scales, leaving bare a portion of the core of the cone. Shape this to resemble

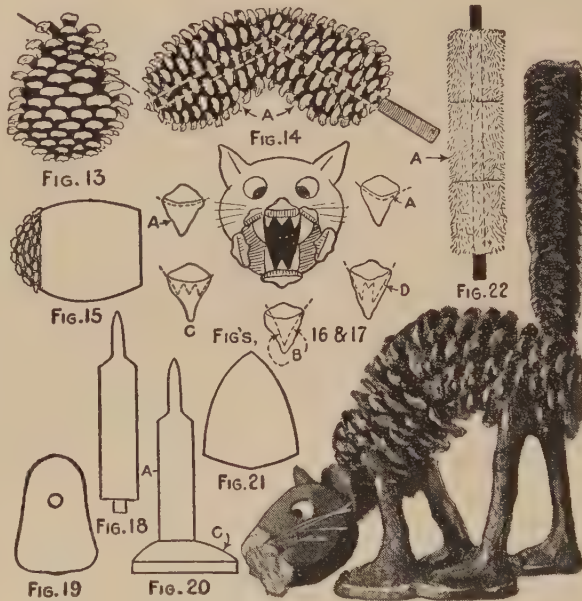
the center of a flower, and drill a small hole to attach the stem. Smaller flowers are made similarly from the bare end of the core, drilled for the stem, which is made from small wire, preferably pipe-stem cleaners. The leaves are made of detached scales and are glued on.

For the butterfly (Fig. 12), trace the design on durable paper, attach with glue two or more scales for the body, and make the wings with scales overlapping like shingles on a roof, as indicated. Paint to suit yourself, and after the paint is dry, tear or cut away the surplus paper. The underside of the wings should be covered with silk or crepe paper, attached with glue that will not stain the material. The tendrils and legs are made of pipe-stem cleaners. Flowers and butterflies may be painted to suit your own fancy.

The cat (Figs. 13 to 20) requires two well-formed cones with all the scales intact. The cones should be equal in diameter, but one slightly longer than the

other. The former makes the forepart of the cat's body. Cut both cones as shown in Fig. 13, and drill holes through the parts in the center to receive a piece of insulated wire with the webbing removed. To join the parts of the body, bend the wire as required to give the humped effect, apply glue to this and to the cut-off

ends of the cones, run the wire through the cones and hold them together with a rubber band or piece of twine until the glue has set. If you want a longer body, two more cones may be cut off in the same way as the turtle shell and attached one to each end of the body, gluing in additional scales where needed. For the head, select



a small cone, cut off the three or four foremost scales and drill a hole in the stem end to receive the protruding end of the wire. Fill and cover the entire open part of the cone with plaster of paris (preferred), furnace cement or putty, and form a flat surface for the mouth on the small end (Fig. 15). Smooth and shape the plastered surface with a putty knife or wooden paddle. If furnace cement is used, dip the putty knife or paddle frequently in cold water. Putty works very nicely if it is warmed before being applied. The head may also be made of wood if desired. The teeth and lips are made of scales, as indicated. The legs (Fig. 18) are formed from sticks and may be straight or slightly crooked, the hind legs a little longer than the fore legs. Match and trim to the length required. Shave the top end to fit between the scales on the body and cut a small, round tenon on the bottom end (Fig. 18) to fit the hole in the foot (Fig. 19). Use $\frac{1}{4}$ -in. wood for the feet.

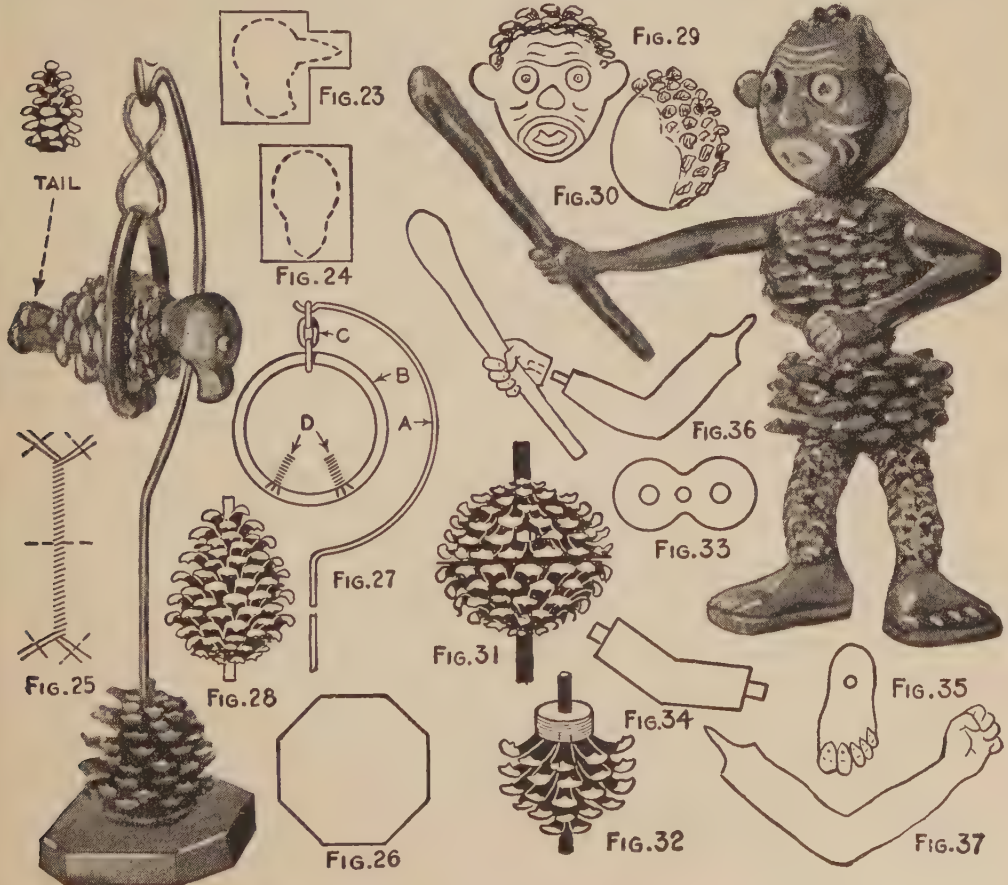
Build them up with plaster of paris, as at C. For the tail (Fig. 22) use the large ends of three or more cones with the scales cut down so that only a small portion remains to give a bristly effect.

Glue the ears and teeth in place. For the neck, use a short section of cone with the scales left on, but if any of them interfere with getting the legs in place, these may be split or removed. To attach the tail, cut the insulated wire flush with the top end, apply glue to the protruding wire on the other end and insert the tail as shown. The best way to paint the cat is to dip it or pour the paint over it, black being the most suitable color. After this is dry, paint the teeth white, the lips and mouth red, the eyes black and white, and the nose white. A scale or a small round-headed peg will serve for the latter. To attach the whiskers, made of bristles, drill holes with a needle, apply glue to the ends and insert them.

The parrot with its perch (Figs. 23 to 28) is a little more elaborate than the other birds, but after trying your hand on those, you will have small difficulty in making it and need but little description to guide you.

The feet and legs are made of pipe cleaners, four pieces being twisted together for the legs (Fig. 25) and the ends left loose to form the toes, cut as indicated by the dotted lines to make a pair. The base is cut from a $\frac{1}{2}$ -in. board about 4 in. in diameter. The upright is a $\frac{3}{16}$ -in. metal rod, 24 to 30 in. long, and bent to the shape shown. The ring should be at least $3\frac{1}{2}$ in. in diameter. The link supporting the ring may be a piece of small chain, or a ribbon may be used. The wings and tail should be made of scales and are dipped in red enamel or lacquer. The assembly is readily understood from the drawings.

The savage (Figs. 29 to 37) is also a good figure to make. The eyes are painted



on, or tacks having large, flat heads may be used instead. The facial wrinkles may be cut or painted in. The upper part of the body is made from the stem ends of two cones, cut off and joined with wire or with a small, round stick. To make the lower part of the body, cut the small end out of a cone, and remove all but four tiers of the mid-section scales (Fig. 32). Drill a hole through the center to receive the long end of the wire protruding from the upper part of the body. The piece in Fig. 33, used to attach the legs to the body, is cut from thin wood and small enough to be entirely covered by the lower part of

the body. The center hole in this piece receives the wire protruding from the lower part of the body, and the outer ones the legs. The latter (Fig. 34) have small tenons to fit in these holes and in holes in the feet, to which small scales are attached for toes. The arms and hands are whittled from small, crooked limbs. The club and the hand holding it are made in one piece. Each arm is made separately with a small tenon on the end to attach it to the hand. Assemble the parts with glue and paint them black, the eyes white, and black, the lips and teeth white, and the inner part of the mouth red.

Trace-Chain Cover Prevents Chafing



To guard against chafing of the horses' flanks, a western farmer took old bicycle tires, cut them in two and slipped the trace chain inside of them as

shown in the drawing. This not only prevents pain, but hushes the noise of the chain as well.—Dale R. Van Horn, Walton, Nebr.

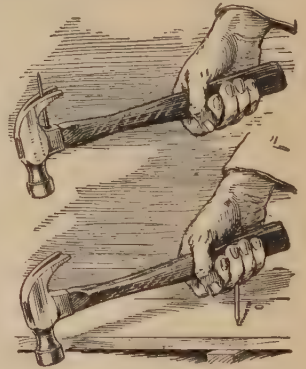
Remedy for Soot-Choked Stovepipes

Where there are several lengths of stovepipe extending from the stove to the chimney there is a tendency for the stove to choke up and allow the smoke to enter the room. This is especially true of stoves burning soft coal. It is not always convenient to remove the pipes, but the trouble must be remedied at once for it is dangerous to let the coal gas escape. A quick remedy that will work at least until it is possible to clean the pipes thoroughly, is to start the fire going at a good rate and, when it is burning brightly, throw in a handful of powdered sulphur. Allow this to burn for a few moments and then throw in a cupful of water which will cause considerable steam. Then close all

the dampers; this will force the soot out of the pipe. Another method is to use paraffin or tallow candles on the coals instead of the sulphur, throwing the water on the coals after the wax has melted.

Method of Starting Nails

When a nail is to be driven at some point so high that it cannot be held conveniently for starting, one of the two methods illustrated may be used successfully. Either the nail is wedged between the claws of the hammer with the head resting firmly



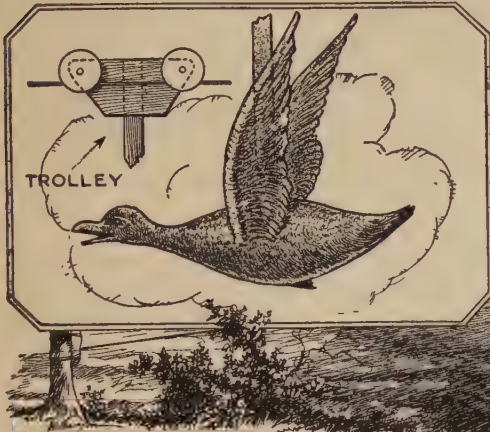
against the latter, as shown in the upper figure, or it can be held between the fingers, letting the head rest against the hammer handle as shown in the lower figure.—W. C. Ratcliffe, Tannersville, Va.

Connecting Auto Stop Light

If the switch controlling the auto stop light sticks, the battery will run down in a short time. To avoid this, I connected mine to the ignition switch instead of to the ammeter. Thus it will not light except when the motor is running.—Pres-ton J. Cheu, Millville, N. J.

Moving Target for Wing Shooting

The drawing illustrates a novel moving target with which the aspiring marksman can practice shooting birds on the wing.



Novel Method of Practice for Shooting Birds on the Wing by Arranging Dummy Bird on an Inclined Trolley Line

It requires no springs or complicated mechanism to effect the flight of the bird but makes use of the force of gravity. The arrangement consists simply of a taut wire, a suitable running gear and a dummy bird cut out of wood or, better still, of metal. First choose the spot for your target practice, which should be an open space of ground secluded from passers-by and, if possible, with trees bordering it a hundred feet or more apart. Select two trees and stretch between them a length of stout wire without kinks or splices. One end should be as high as you can reach and the other end about 3 ft. from the ground. The trolley is easily made by cutting a piece of wood to the shape indicated, about 4 in. wide and 8 in. long on the top. Pivot a window weight wheel at each end, near the top, with screws so that the wheels can turn freely. Then, on the back side of the board, screw a strip of strap iron at right angles to the edge so that it will project below the wood about 1 ft. The bird should be large enough to form a fair-sized target. A goose is shown in

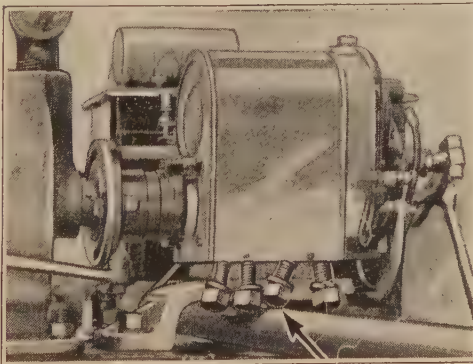
the illustration, and was made out of hardwood. However, metal can be used, if desired, although it is harder to form for the amateur. Suspend it from the bottom of the strap iron, as shown, and paint it to imitate the bird. Take your stand in the clearing and have a companion place the rollers on the wire. Then, at a signal,



let him start the trolley down the incline. The bird will gain speed on its flight and will offer a fine test for your skill in shooting on the wing. Arrange some bagging at the other tree to take up the shock when the bird hits it.—L. B. Robbins, Harwich, Mass.

Magneto Holds Loose Bolts

While making repairs and adjustments on a tractor, which requires the removal of small bolts, there is danger of having these mislaid and lost if they are merely placed on some surface of the machine, and especially if the work has to be per-

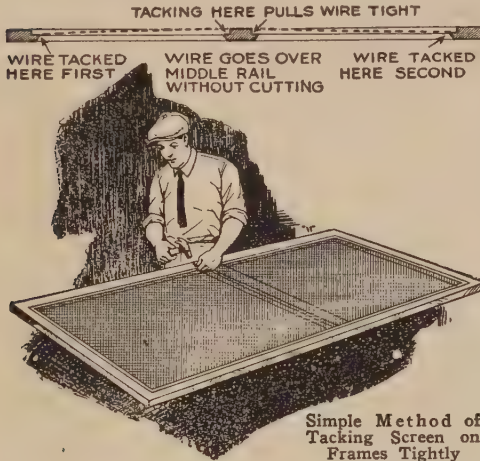


Using Tractor Magneto to Hold Loose Bolts While Making Repairs

formed out in the field, where a suitable box is not at hand. The photo shows how the parts may be placed on the base of the magneto and held there by the magnets. They cannot easily be brushed off from here and can be distributed so that their proper places may be known when replacing them.—George G. McVicker, North Bend, Nebr.

Attaching Screen Tightly to Frames with Center Rails

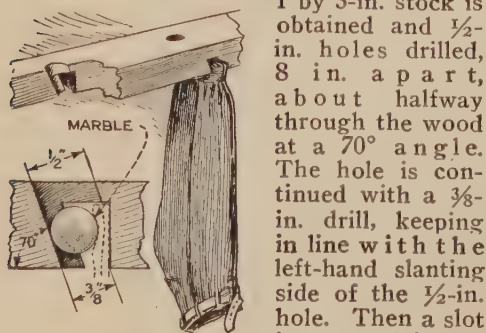
Fastening screen to door and window frames, so that it is without wrinkles and



loose places, can be done easily by the simple method shown in the illustration. Cut a piece of screen about 6 in. longer than the whole opening to be covered. Then tack it at one end, stretch it as well as possible by hand and tack at the other end. It will not be quite taut, but by tacking it down on both sides of the crosspiece, all sag will be taken out. The screen can now be tacked along the sides without difficulty, and the surplus at one end cut off with an old file sharpened to a knife-edge.

Hanger for Clothes Closet Saves Space

In closets where space is limited, the novel clothes hanger shown in the illustration will be found useful. A length of



board, slanting through the middle of the smaller hole and straight on the opposite side, as shown in the cross-sectional view.

Marbles, which just fit in the $\frac{1}{2}$ -in. hole, are dropped in at the top. They cannot fall out through the $\frac{3}{8}$ -in. hole but stop near the bottom binding against and holding the clothing.

Keeping Handles on Sharp-Edged Tools

Handles often come off chisels, gouges and other tools when using them. The following method will remedy the trouble. Mix 2 parts of wax, 2 parts of brick dust and 8 parts of rosin, heat the mixture and apply it to the inner surfaces of the tool handles, then immediately insert the shank of the tool. If this is done quickly, the shank will stick in the handle securely.

Preserving Botanical Specimens

Preservation of botanical specimens, such as leaves and flowers, by pressing them in books is rather unsatisfactory as they are apt to become damaged when removed for examination or study. A better method is to remove the specimens from the books after they have been pressed and dried, and place them between photographers' dry plates, from



Preheater for Ford Inlet Manifold

A preheater for the inlet manifold on Ford cars, which will prove satisfactory even on low-grade gas, can be made simply by wrapping some stranded copper wire, of the kind used for radio aerials, around both inlet and exhaust manifolds, to bind them into one unit. The copper conducts the heat from the exhaust to the inlet manifold and helps vaporize the fuel. —G. E. McAllan, Millicent, Can.

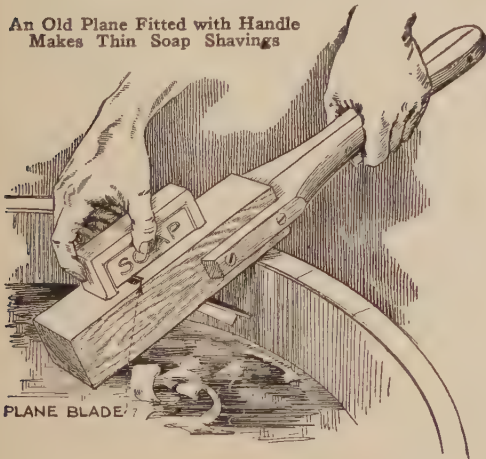
Improving the Hedge Shears

Everyone who has used the 6 to 8-in. hedge shears has found them impractical for removing canes of advanced growth, since the shears slip. This trouble may be overcome, without decreasing the usefulness of the shears for regular work, by filing notches in one blade as follows: Mark one blade, its entire length, at $\frac{1}{2}$ -in. intervals. At each mark place the corner of a flat file on the cutting bevel and file notches at least $\frac{1}{8}$ in. deep. I make a business of trimming trees and shrubs. Several years ago, while attempting to trim an overgrown privet hedge with a new pair of shears I became disgusted and applied my file, and have filed notches in every shear I have used since.—John W. Farmer, Kansas City, Mo.

Shaving Soap for the Washing Machine

It is quite difficult to cut soap shavings thin enough for the washtub so that they will soon dissolve and work into lather quickly. With the aid of the cutter shown in the illustration, however, this can be done easily. The tool is made in the following way: Get a piece of 2 by 4-in. pine, 18 or 20 in. long; drill several holes slanting through one side, and chisel out the material between them to make one rectangular slot. Then provide a plane bit and a wooden wedge to hold the bit in place. The surface should, of course, be sandpapered smooth to prevent getting splinters into the hand or fingers. If an old wooden plane is obtainable, it can be used simply by adding a handle as shown. In

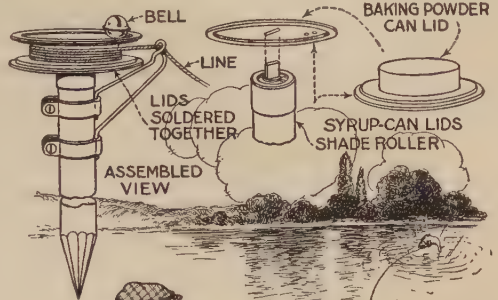
An Old Plane Fitted with Handle
Makes Thin Soap Shavings



either case, soap shavings can be cut so thin that they are nearly transparent.—E. D. Fahling, Tama, Iowa.

Automatic Mechanical Fisherman

This automatic fisherman, made from an old window-shade roller and three tin-can lids, will hook and play a fish until



With This Mechanical Fisherman the Fish Is Hooked
and Played Automatically

the fisherman gets there. Its construction is clearly shown in the upper details of the illustration. The lids are soldered together to form a reel for the fishline and this reel is in turn soldered securely to the square pin on the end of the shade roller. A little bell may also be fastened to the top of the reel to give an alarm when a fish is caught. The lower end of the shade roller is pointed so that it can be pushed into the bank to stand solidly. A wire bracket, with a small eye, is clamped to the roller just under the reel, to serve as a guide for the line, as shown in the left-hand detail.

The end of the line is tied to the reel and wound around it a few times, then pulled out until the tension of the spring is quite strong. Then the catch is allowed to lock, and the line is cast out. About one turn of the line should be left on the reel to take up the shock when the fish bites. When the fish pulls the line the catch releases, giving a sudden jerk, which hooks the fish. The catch will not lock again as long as the fish keeps on fighting.—A. Perrault, Vancouver, Can.

Sharpening Skates with a File

Two methods are shown in the sketches for filing skates—one for hollow filing and the other for filing flat

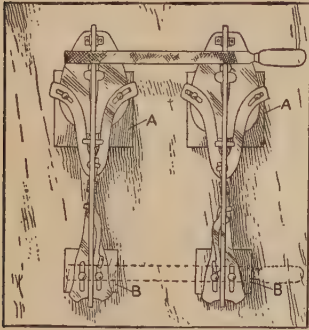


FIG. 1

Filing a Flat Surface

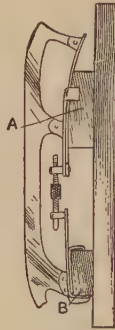


FIG. 2

and straight across the blade. The method shown in Figs. 1 and 2 is for filing the blade flat. The device for holding the skates consists of a board on which four blocks, AA and BB, are nailed. These blocks are fastened on the board in the relative positions of the heel and sole on a shoe. The skates are clamped on them in the same manner as on a shoe. A flat file is drawn across both blades of the skates as shown. After the roundness is cut down on the edges of the blades the skates are removed and the file is drawn along the sides to remove the

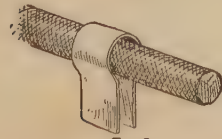


FIG. 3

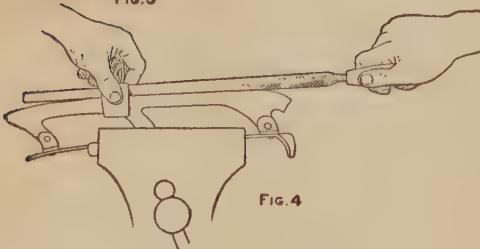


FIG. 4

Filing a Curved Surface

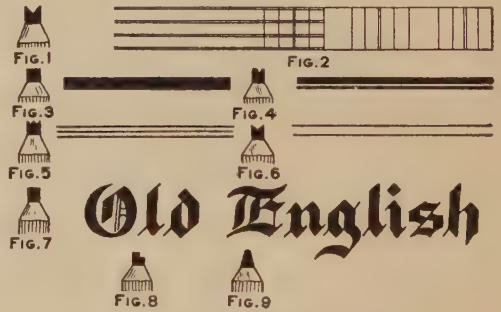
burr. Skates filed in this way have flat surfaces with sharp edges.

Some skaters like a hollow-ground skate and the method shown in Figs.

3 and 4 can be used for filing a slightly curved surface in the blade. A piece of tin or sheet metal is shaped over a round file as shown in Fig. 3. The manner of filing the curves is shown in Fig. 4. The piece of metal is held over the file and blade of the skate as the file is worked.

Lines and Letters Made with a Carpenter's Pencil

The sketch shows some unusual work made with a carpenter's pencil. If the flat lead is notched with a three-cornered file (Fig. 1), two parallel lines may be drawn at one stroke, or various rulings may be made, as shown in Fig. 2. Broad lines can be made, as shown in Fig. 3, or unequal widths as in Fig. 4.



Pencil Points and Their Work

In Figs. 2, 5 and 6 are shown lines especially adapted for the bookkeeper or draftsman. If one lacks the ability to draw old English letters with a pen, the letters may be first drawn with a carpenter's pencil (Fig. 7) and the outlines marked with ink and finally filled in. Narrow lines are made with points cut as in Figs. 8 and 9. A little practice with the carpenter's pencil in making these letters will enable the student to finally produce them with the pen used for the purpose.

Aluminum wire plunged hot into a cold solution of carbonate of soda becomes coated with a strong layer of oxide which forms an excellent insulator to electricity.

How to Build an Ice-Yacht*

The plans and specifications shown in the illustrations are for making a 400-ft. class ice-yacht, having a double cockpit to accommodate four persons. The weight of the persons in the forward cockpit keeps the boat from rearing when in a stiff breeze. The forward cockpit can be removed if necessary.

The materials used are: backbone,

plainly shown in the sketches. The backbone is $37\frac{1}{2}$ ft. over all, 12 in. in the center, 5 in. stern, $3\frac{1}{2}$ in. at the nose; width $4\frac{1}{4}$ in. All wood should be selected from the best grades, well seasoned and free from checks. In Fig. 1 is shown the complete ice-yacht with general dimensions for the sail and main parts. Other dimensions are shown in Fig. 2. The backbone is

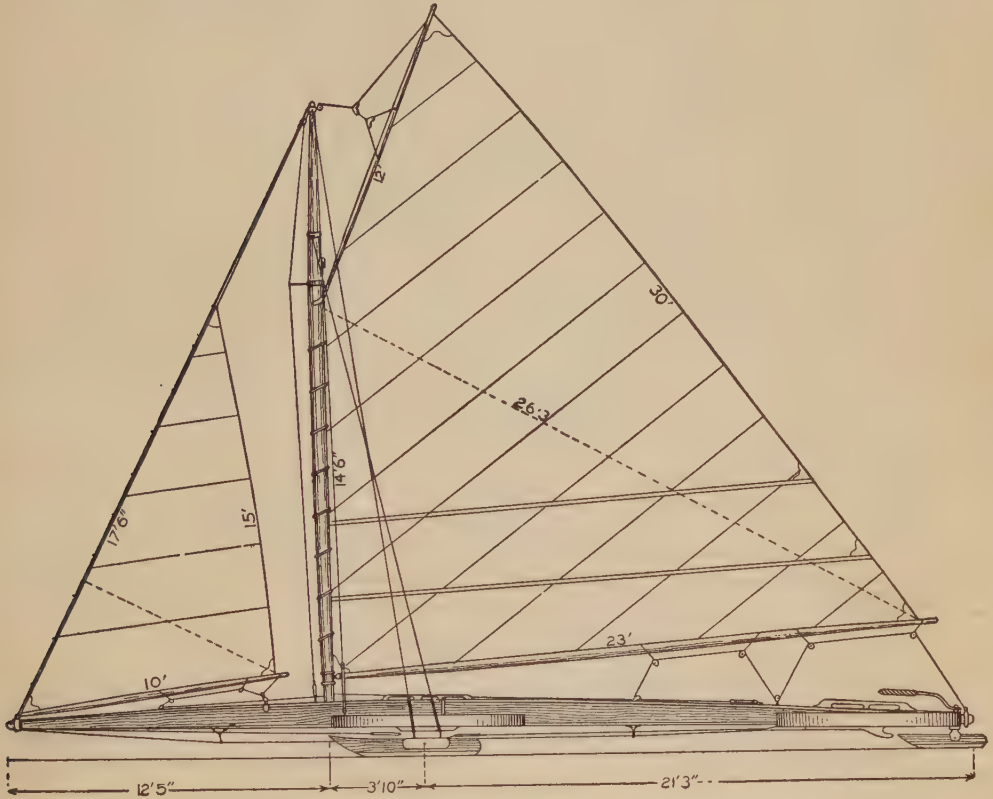


FIG. 1
Ice-Yacht Complete

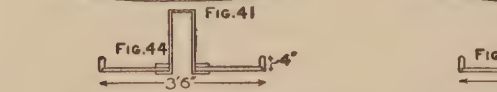
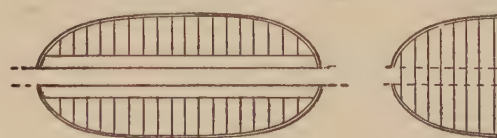
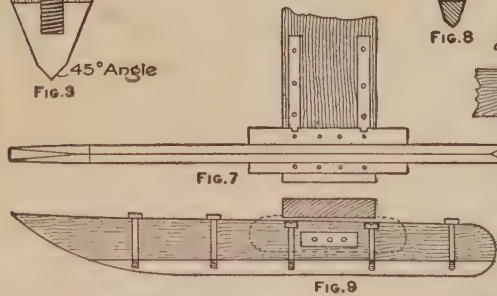
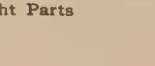
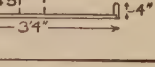
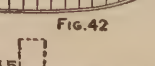
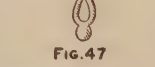
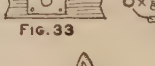
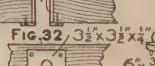
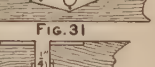
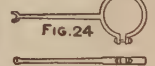
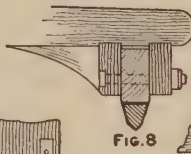
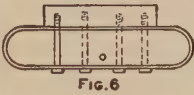
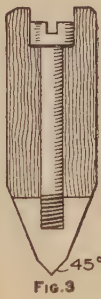
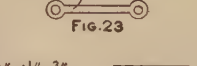
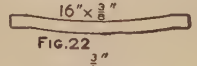
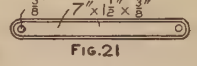
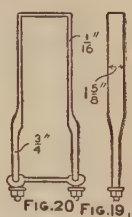
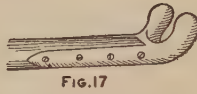
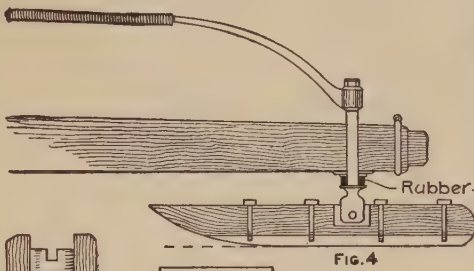
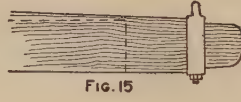
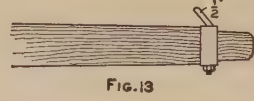
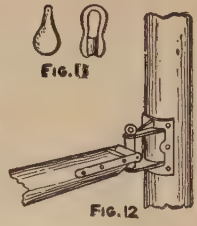
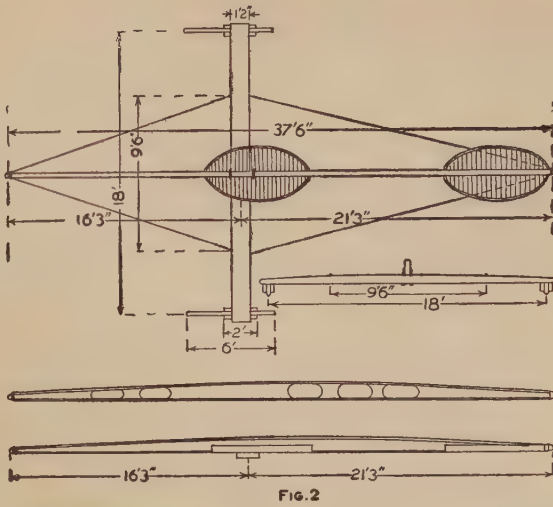
white pine; center, clear spruce; sides, white oak caps; runner plank, basswood, butternut or oak; cockpit, oak; runners, chocks, etc., quartered white oak. All the iron work should be first-grade Swedish iron, with the exception of the runners, which are soft cast iron.

It is not necessary to go into detail with the measurements as they are

capped on the upper and lower edges full length with strips of oak, $4\frac{1}{4}$ in. wide and $\frac{5}{8}$ in. thick. The lengthwise side strips of spruce are $1\frac{1}{4}$ in. thick. The filling-in pieces placed between the side pieces are of seasoned white pine, leaving the open places as shown in Fig. 2. The parts are put together with hot glue and brass screws.

The runner plank should be placed

*Condensed from an article by H. Percy Ashley in *Rudder*.



Details of the Ice-Yacht Parts

with the heart of the wood up, so as to give the natural curve from the ice so that it will act as a spring. The plank is 16 in. wide in the center, 14 in. at the ends; $4\frac{1}{8}$ in. thick at the center and $2\frac{3}{4}$ in. at the ends.

Details of the runners are shown in Figs. 3, 4, 5, 6, 7, 8 and 9. The cast iron shoes are filed and finished with emery paper, making the angle on the cutting edge 45 deg. on both sides. The runners are $7\frac{1}{4}$ in. wide over all and $2\frac{1}{8}$ in. thick. The soft iron casting is $2\frac{1}{4}$ in. deep. The shoes are fastened by $\frac{5}{8}$ -in. machine bolts. These are shown in Figs. 3 and 9. The rudder is $2\frac{3}{4}$ in. thick, 5 in. deep, including wood and iron, and 3 ft. long. The cast iron shoe is $1\frac{7}{8}$ in. deep and fastened on with four $\frac{1}{2}$ -in. machine bolts. A brass plate, $\frac{1}{4}$ in. thick, 2 in. wide and 7 in. long, is inserted on each side of the runners as shown in Fig. 9. Three holes are drilled through for a $\frac{3}{4}$ -in. riding bolt that can be shifted as desired for rough or smooth ice. The runner chocks and guides are $1\frac{7}{8}$ in. thick and $4\frac{1}{2}$ in. deep. They are set in the runner plank $\frac{1}{4}$ in. and fastened with glue and $\frac{1}{2}$ -in. lag screws. These are shown in Figs. 6 and 7.

The aft cockpit is stationary, while the fore or passenger cockpit can be removed at will. Both cockpits are the same size, 42 in. wide and 7 ft. long over all. Each one has a bent rail, $1\frac{1}{2}$ in. by 4 in., grooved $\frac{1}{2}$ in. by $\frac{7}{8}$ in. before bending. The flooring is of oak, $1\frac{1}{2}$ in. thick and 4 in. wide, tongue-and-grooved. The forward cockpit is made in halves and hung on the backbone with wrought-iron straps and bolts. These are shown in Figs. 41, 43 and 44. Two pieces of oak, $\frac{1}{2}$ in. by 4 in. are fastened with screws to the flooring, parallel with the backbone in the forward cockpit. The runner plank which passes under this cockpit gives it stability.

The spars should be hollow and have the following dimensions: Mast, 23 ft. 3 in.; heel, $3\frac{3}{4}$ in.; center, $5\frac{1}{4}$ in.; tip, 4 in.; boom $23\frac{1}{2}$ ft.; heel, $3\frac{3}{4}$ in.; center, 4 in.; tip, $2\frac{7}{8}$ in. at ends; gaff, $12\frac{1}{2}$ ft.; center, $3\frac{1}{2}$ in.; ends, $2\frac{1}{2}$ in.; jib-

boom, $10\frac{1}{2}$ ft.; $1\frac{3}{4}$ in. at the ends, $2\frac{1}{8}$ in. at the center. The gaff is furnished with bent jaws of oak, Fig. 17, and the main boom with gooseneck, Fig. 12.

Galvanized cast-steel yacht rigging, $\frac{5}{16}$ in. in diameter, is used for the shrouds; jibstay, $\frac{3}{8}$ in. in diameter; runner plank guys, $\frac{5}{16}$ in. in diameter; bobstay, $\frac{3}{8}$ in. in diameter; martingale stay, $\frac{1}{4}$ in. in diameter. The throat and peak halyards are $\frac{3}{8}$ in. in diameter; jib halyards, $\frac{1}{4}$ in. in diameter.

The main sheet rigging is $\frac{9}{16}$ -in. Russian bolt rope; jibs, $\frac{7}{16}$ -in. manila bolt rope, 4-strand; jib-sheet, $\frac{3}{8}$ -in. manila bolt rope. Four $\frac{1}{2}$ -in. bronze turnbuckles, Fig. 34, are used for the shrouds; one $\frac{5}{8}$ -in. turnbuckle for the jibstay and one for the bobstay; four $\frac{3}{8}$ -in. turnbuckles for the runner plank stays, and one for the martingale stay.

Two rope blocks for $\frac{3}{8}$ -in. wire rope, Fig. 10, are used for the peak and throat, and one block for the wire rope $\frac{1}{4}$ in. in diameter for the jib halyard. Four 6-in. and one 7-in. cleats, Fig. 18, are used. The blocks shown in Fig. 11 are used for the main and jib sheets. The steering arrangement is shown in Figs. 4 and 5. The tiller is $3\frac{1}{2}$ ft. long; rudder post, $1\frac{1}{4}$ in. in diameter; shoulder to lower end of jaws, 4 in.; depth of jaws, $2\frac{7}{8}$ in.; length of post including screw top, 12 in. The rubber washer acts as a spring on rough ice.

In Figs. 13, 14, 15 and 16 are shown metal bands for the nose of the backbone, and Figs. 19, 20, 21, 22 and 23 show the saddles that fit over the backbone and hold the runner plank in place. There are two sets of these. A chock should be sunk in the runner plank at each side to connect with the backbone to keep it from slipping sideways as the boat rises in the air. The martingale spreader is shown in Figs. 24 and 25. Straps through which the ring bolts for the shrouds pass on the ends to fasten the turnbuckles for the runner plank guys are shown in Figs. 26 and 27. The bobstay spreaders are shown in Figs. 28, 29 and 30. In Fig. 31 is shown the top plate for the rudder post and in Figs. 32 and 33, the lower plate for same. The mast step is shown

in Figs. 35, 36 and 37. Two positions of the jib traveler are shown in Fig. 38. The anchor plate for the bobstay under the cockpit is shown in Figs. 39 and 40.

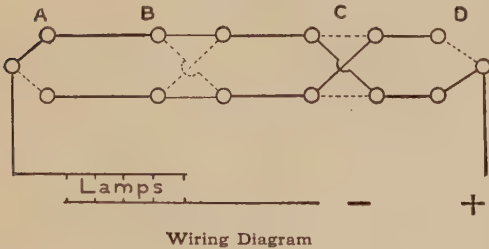
At the nose and heel the runner plank guys end in a loop. The bobstay has a loop at the nose and ends in a turnbuckle that fastens to the anchor plate under the cockpit, aft. The shrouds, jibstay and martingale have loops at the masthead and are spliced bare over solid thimbles. The loops are finished in pigskin and served with soft cotton twine over the splice and varnished. The parceling is done with insulating tape. Serve the tiller with soft cotton twine and ride a second serving over the first. For the halyards hoisting use a jig shown in Fig. 46.

The thimble shown in Fig. 47 is made by splicing the rope to the thimble at running part of halyard and passing back and forth through cleat and thimble. This gives a quick and strong purchase and does away with cumbersome blocks of the old-fashioned jig. The jib-sheet leads aft to the steering cockpit. The main-sheet ends in a jig of a single block and a single block with becket. Be sure that your sail covers are large enough—the sail maker always makes them too tight. The cockpit covers must fit tightly around the cockpit rail. Many boats have sail and cockpit covers in one piece.

The woodwork may be finished as desired by the builder. The dimensions of the sails are given in the general drawing, Fig. 1.

Turning Lights On and Off from Any Number of Places

This can be done by the use of any number of reversing switches such as



those shown at B and C. These are inserted between the two-way switches A and D. Turning such a switch up or down connects the four contact pieces either diagonally as at C, or lengthwise as at B. The diagram shows connection from A to D, when the lamps will be on, but by turning either of these four switches into its alternative position, shown by the dotted lines, the circuit will be broken and the lights extinguished. When this has been done, the circuit may be restored and the lamps lighted again by altering either of the four switches in exactly the same way, and so on.

It will be observed that a reversing switch used in this way practically un-

does whatever is done by the other switches. In the accompanying diagram only two reversing switches are shown and the lights can be independently controlled from four distinct positions. Any number of reversing switches can be placed between the two-way switches A and D to increase the number of places from which the lights could be turned on and off.—Contributed by J. S. Dow, Mayfield, London.

How to Make an Electric Pendant Switch

It is often desired to use a pendant switch for controlling clusters of incandescent lamps. When such a switch is not at hand, a very good substitute can be made by screwing a common fuse plug into a key socket and connecting the socket in series with the lamps to be controlled. In this way you get a safe, reliable, fused switch.—Contributed by C. C. Heyder, Hansford, W. Va.

ⒸNever guess the length of a piece of work—measure it.

Home-Made Water Motor

The small water motor shown in the illustration is constructed in the same manner as a German toy steam turbine. The wheel, which is made of aluminum $\frac{1}{8}$ in. thick and 7 in. in diameter, has 24 blades attached to it.

The lugs or extensions carrying the rim must be made from the metal of the wheel, therefore a circle 8 in. in diameter must be first described on the aluminum plate, then another circle 7 in. in diameter within the first and then a circle for the base of the blades, $3\frac{1}{2}$ in. in diameter. Twenty-four radial lines at equal distances apart are drawn between the two smaller circles and a $\frac{1}{4}$ -in. hole drilled at the intersecting points of the radial lines and the innermost circle.

Centrally between each pair of radial lines and between the two outer circles, $\frac{1}{2}$ by $\frac{3}{8}$ -in. lugs are marked out and the metal cut away as shown in Fig. 1. A $\frac{1}{8}$ -in. hole is then drilled in the center of each lug. Each division is separated by cutting down each radial line to the $\frac{1}{4}$ -in. hole with a hacksaw. Each arm is then given a quarter turn, as shown by the dotted lines in Fig. 2, and the lug bent over at right angles to receive the rim. The rim is made of the same material as the disk and contains twenty-four $\frac{1}{8}$ -in. holes corresponding to those in the lugs to receive brass bolts $\frac{1}{4}$ -in. long.

The disks PP were taken from the ends of a discarded typewriter platen, but if these cannot be readily obtained, they can be turned from metal or a heavy flat disk used instead.

The casing was made from two aluminum cake pans whose diameter was 8 in. at the base, increasing to 9 in. at the rim. The centers of these were located and a $\frac{1}{4}$ -in. hole drilled for the

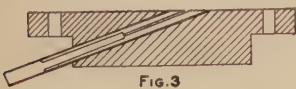


Fig. 3

shaft. The disks P are the same as used on the wheel. Six holes $\frac{1}{8}$ -in. in diameter were drilled through the flat part of the rims while the two halves were held together in a vise. Bolts were placed through

these holes to join the casing when ready for assembling. One side of the casing was then bolted to two 4-in. ordinary metal shelf brackets which were

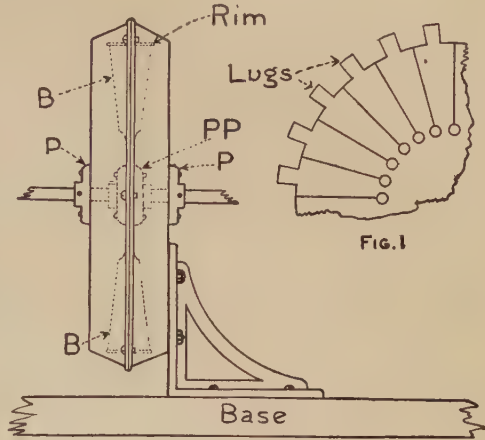


FIG 2
Details of Motor

screwed to a substantial wood base. This kept one-half of the casing independent of the main structure so that the wheel is easily accessible.

The nozzle was made of $\frac{1}{2}$ -in. brass pipe which was first filled with molten babbitt metal. When the metal was cool, a $\frac{1}{4}$ -in. hole was drilled halfway through the length of the tube, the hole being continued through to the other end by means of a $\frac{1}{8}$ -in. drill. The lower orifice was then slightly enlarged with a small taper reamer, and the upper portion of the bore was reamed out almost to the brass to make a smooth entrance for the water.

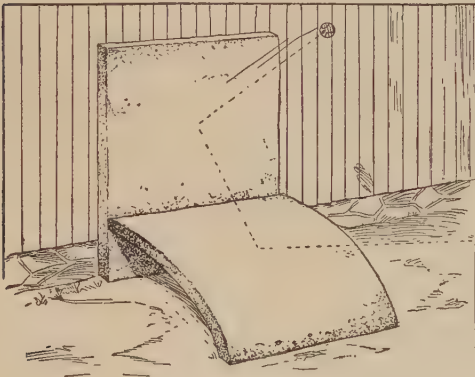
A fixture to hold this nozzle is shown in Fig. 3. It was cast of babbitt metal in a wood mold. The hole for the nozzle was drilled at an angle of 20 deg. to the plate part. An alternative and perhaps easier way would be to insert the nozzle in the mold at the proper angle and cast the metal around it. A hole was then cut in one of the sides of the casing at a point $2\frac{7}{8}$ in. along a horizontal line from the center. The nozzle fixture was then bolted on with

the exit orifice of the nozzle pointing downward and through the hole in the casing.

Six $\frac{1}{8}$ -in. holes were drilled through the flat portions of the rims while the two halves of the casing were held securely together in a vise. Bolts were used in these holes to join the casing.

Device for Baseball Throwing Practice

Anyone training to be a baseball player will find the device shown in the accompanying illustration a great help



Ball Bounding on Concrete Slabs

when practicing alone. It consists of two cement slabs, one flat and upright, the other curved and on the ground. The vertical slab is fastened securely against a fence, barn or shed. The barn or the shed is preferable, for if the slab is fastened to a fence, the ball will bound over a great many times and much time will be lost in finding it.

The player stands as far as he cares from the slabs and throws the ball against the lower slab. The ball immediately rebounds to the upright slab and returns with almost as great a force as it was delivered. If the thrower does not throw the ball exactly in the same spot each time, the ball will not rebound to the same place, consequently the eye and muscles are trained to act quickly, especially if the player stands within 15 or 20 ft. of the slabs and throws the ball with great force.

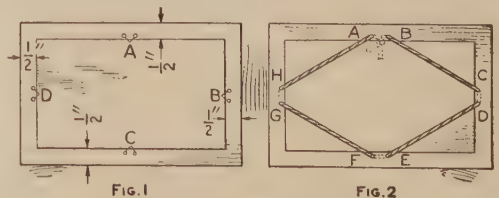
The wheel was used on the drip-board of a kitchen sink and no provision was made to carry off the spent water except to cut two $\frac{1}{2}$ -in. holes in the bottom of the casing and allowing the waste to flow off directly into the sink.—Contributed by Harry F. Lowe, Washington, D. C.

This apparatus also teaches a person to throw accurately, as a difference in aim of a few inches on the lower slab may cause the ball to fly away over the player's head on the rebound.—Contributed by F. L. Oilar, La Fayette, Indiana.

How to Mail Photographs

Cut a piece of cardboard 1 in. longer and 1 in. wider than the mount of the photograph and lay the picture on it in the center. This allows a $\frac{1}{2}$ -in. border on all sides of the photograph. Punch two holes 1 in. apart at A, B, C and D, Fig. 1, in the cardboard border close to the edge of the picture. Put a string up through the hole B, Fig. 2, then across the corner of the photograph and down through the hole C and up through hole D, then to E, etc., until the starting point A is reached, and tie the ends.

The photograph will not get damaged, if it is covered with tissue paper and placed with the face to the cardboard. The extension border of cardboard prevents the edges of the mount from being damaged and the corners



Back for Mailing Photo

from wearing. Both cardboard and photograph are wrapped together in paper, and the package is ready for mailing.—Contributed by Earl R. Hastings, Corinth, Vt.

A Mystifying Watch Trick

Borrow a watch from one of the audience and allow the owner to place it in the box, as shown in Fig. 1. This box should be about 3 in. long, 4 in. wide and $2\frac{1}{2}$ in. deep, says the Scientific American. It should be provided with a hinged cover, M, with a lock, N. The tricky part of this box is the side S, which is pivoted at T by driving two short nails into it, one through the front side and the other through the back, so that when S is pushed in at the top, it swings around as shown in Fig. 1 and allows the watch to slide out into the performer's hand. The side S should fit tightly when closed, so that the box may be examined without betraying the secret. As the side S extends down to the bottom of the box, it facilitates the use of the fingers in pulling outward at the lower part while the thumb is pressing inward at the top part. The side of the box opposite S should be built up in the same way, but not pivoted.

Use a flat-bottom tumbler, A, Fig. 2, containing an inner cone, B, for the reproduction of the watch. The cone is made of cardboard pasted together so it fits snugly inside of the tumbler. The cone is closed except at the bottom, then bran is pasted on the outside surfaces to make the tumbler appear as if filled with bran when it is in place. Place the tumbler with the cone inside on a table somewhat in the background. Put some loose bran on top of the cone and allow the cork, attached as shown in B, Fig. 2, to hang down on the outside of the tumbler, away from the audience. A large handkerchief should be laid beside the tumbler.

After the watch has been placed in the box, Fig. 1, the performer takes the box in his left hand, and while in the act of locking it with his right hand secures possession of the watch as previously explained. Tossing the key to the owner of the watch, the performer places the box on a chair or table near the audience and, with the watch securely palmed, walks back to

get the tumbler. Standing directly in front of the tumbler with his back toward the audience, the performer

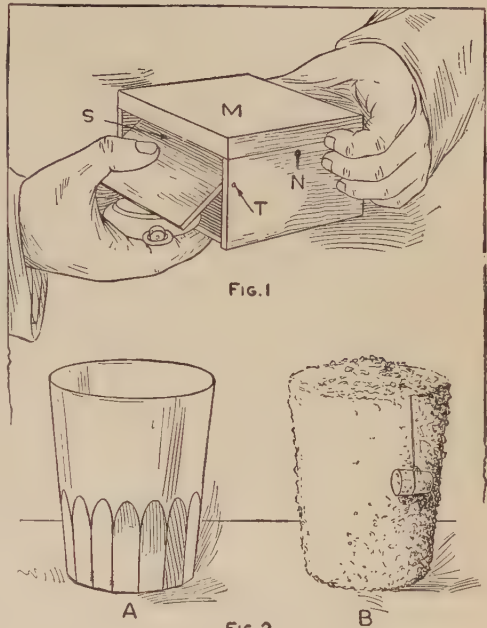


FIG. 2
Parts for the Watch Trick

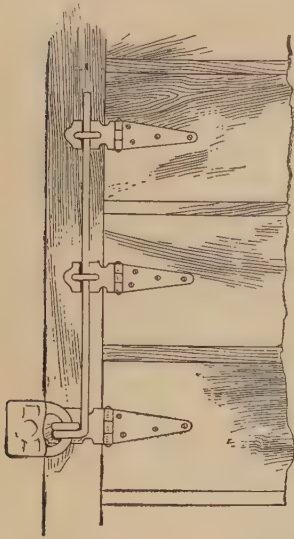
quickly raises the cone with his right hand, lays the watch in the bottom of the tumbler and replaces the cone.

The loaded tumbler and the handkerchief are then brought forward, and the former is placed in full view of the audience with the cork hanging down behind it. The performer calls attention to the tumbler being full of bran and picks up some of it from the top to substantiate his statement. He then spreads the handkerchief over the tumbler, commands the watch to pass from the box into the tumbler and the bran to disappear.

The box is then handed to the owner of the watch so that he may unlock it with the key he holds. As soon as the box is found to be empty, the performer grasps the handkerchief spread over the tumbler, also the cork tied to the cone. Raising the handkerchief, he carries up the cone within it, leaving the watch in the bottom to be returned to its owner.

Locking Several Drawers with One Lock

A series or row of drawers can be secured with one lock by using the device shown

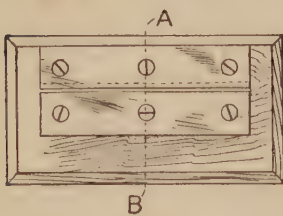


in the sketch. This method takes away several dangling locks and the carrying of many keys. A rod is used through the various staples over the hasps. The rod is upset on one end and flattened

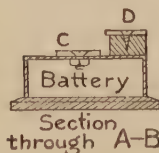
to make sufficient metal for drilling a hole large enough to insert the bar of a padlock. If the bar is made of steel and hardened, it is almost impossible to cut it in two.—Contributed by F. W. Bentley, Huron, S. Dak.

Testing Small Electric Lamps

The accompanying sketch shows the construction of a handy device for testing miniature electric lights. The base is made to take in an electric flash lamp battery. Two strips of brass, C and D, are connected to the battery. The lamp is tested by put-



Lamp Tester



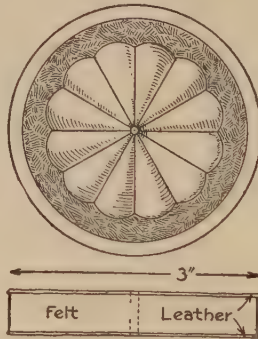
ting the metal end on the lower brass strip and the side against the upper one. A great number of lamps can be

tested in a short time by means of this device.—Contributed by Abner B. Shaw, North Dartmouth, Mass.

How to Make a Pin Ball

The pin ball shown in the illustration is made of calfskin modeling leather and saddler's felt. Two pieces of leather are used, and one piece of felt, all three being cut circular to a diameter of about 3 in. The felt may be about $\frac{1}{2}$ in. thick, and leather of a deep brown color is recommended.

Moisten the leather on the back side with as much water as it will take without showing through the face. Lay it on a sheet of heavy glass or copper, or other hard, smooth, nonabsorbent material. Place the design, which has been previously prepared, over the face of the leather. Indent the outline of the design with a nutpick or any other pointed tool that will not cut the leather. Remove the pattern, and go



Made of Leather and Felt



over the outline again to deepen the tool marks.

The space between the border and the design is now stamped with a cup-pointed nail set, care being taken not to cut the leather, especially if the tool be new. Rubbing the edges of the nail set over a piece of emery paper will serve to dull them, if they are too sharp.

When the designs have been worked on the leather, paste or glue the leather to the two sides of the belt, and punch a hole in the center through which to place a cord for hanging up the ball.

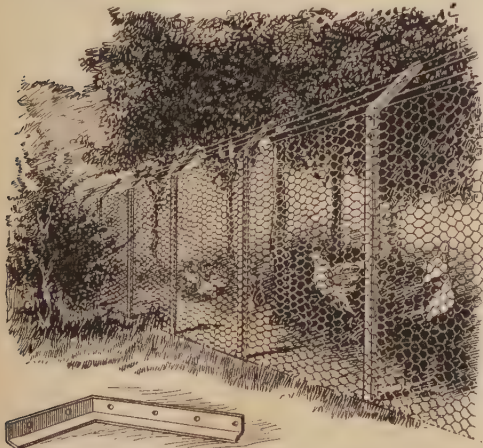
Kitchen Utensils from Ice-Box Shelves

From an old discarded ice box I removed the shelves and found them useful for cooling breads, cakes and pies or anything requiring ventilation. After covering these shelves with paraffin paper they are fine for cooling drop candies. Delicious toast can be made quickly and in quantities by using one of these shelves placed on a hot cookstove as a toaster. By removing the top and one cross-piece of the stove, placing the shelf over a bed of coals and inverting a bread pan over it, you have an ideal broiler. It can also be used in the oven when doing slow baking, and no doubt, housewives under whose eyes this will come will find a great number of other uses for them while going about their duties.—Mrs Mattie A. Siegelman, Cairo, Ill.

Use for Broken Steel Fence Posts

Fence Posts

Broken steel fence posts make good brace arms at the top for preventing horses and cattle from reaching over and damaging the fence, and also are useful for chicken runs. The posts, which are usually made of angle iron, are cut off to 2-ft. lengths, and one flange is cut through about 15 in. from one end. The piece is then heated until red and bent to the angle shown. The pieces are bolted to the fence posts as in-

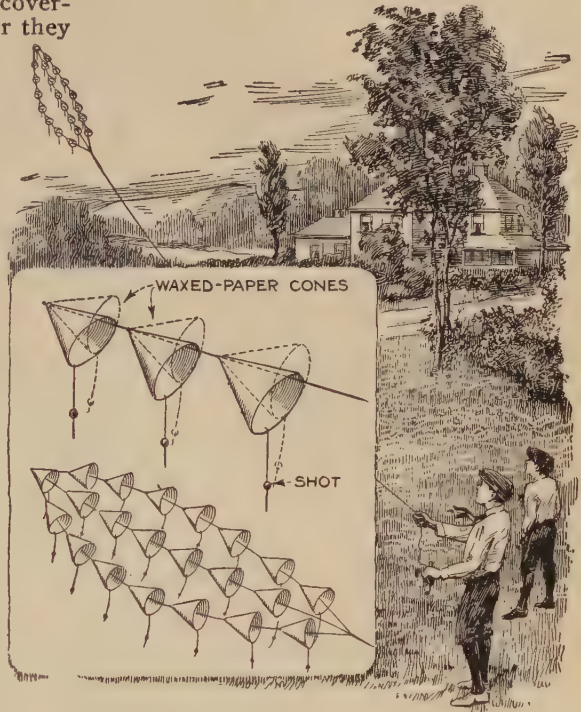


Angle Top on Fences Protects Them against Cattle and Prevents Chickens from Flying Over

licated, and barb wire or 12-in. wire mesh is stretched over them.

Flying a "Drinking-Cup" Kite

Flying kites will always be a popular boys' sport and a distinctly new type of kite, which has been found successful, is



Kites Made from Cone Drinking Cups Fly Successfully

shown in the drawing. It is made from ordinary cone drinking cups, a number of which can be purchased for a few cents. The sharp end of the cone allows the kite to climb in the wind while a small lead shot, split and attached to a short length of thread, which is fastened to the rim of each cone as indicated, acts as a tail. Small round split fishline sinkers can be used instead of shot. The cones are strung at intervals along the line and the kite can be fashioned into various shapes, depending on the ingenuity of the builder. The "pull" of the kite increases with the number of cones used. The tow lines are threaded through the point of the cones.—John R. Malloy, Fort Worth, Tex.

Meerschaum Cement

Quicklime added to the raw white of an egg until the mixture assumes the consistency of a thick cream, has been found to be a good meerschaum cement. As usual, it is necessary to thoroughly clean the surfaces to be cemented and the parts should be held in clamps for at least 24 hours.

Repairing a Broken Phonograph Spring

As I live a great distance from a railroad station, I did not care to pay the price, and await the time necessary to deliver a new phonograph spring to replace one that broke in my machine, and I repaired the old one in a creditable manner as follows:

I forced the two ends of the break out where I could get at them, then heated each end separately with a pair of redhot tongs and turned a hook or

A Small Bench Lathe Made of Pipe Fittings

The most important machine in use in the modern machine or wood-working shop is the lathe. The uses to which this wonderful machine can be put would be too numerous to describe, but there is hardly a mechanical operation in which the turning lathe does not figure. For this reason every amateur mechanic and wood-worker who has a workshop, no matter how small, is anxious to possess a lathe of some

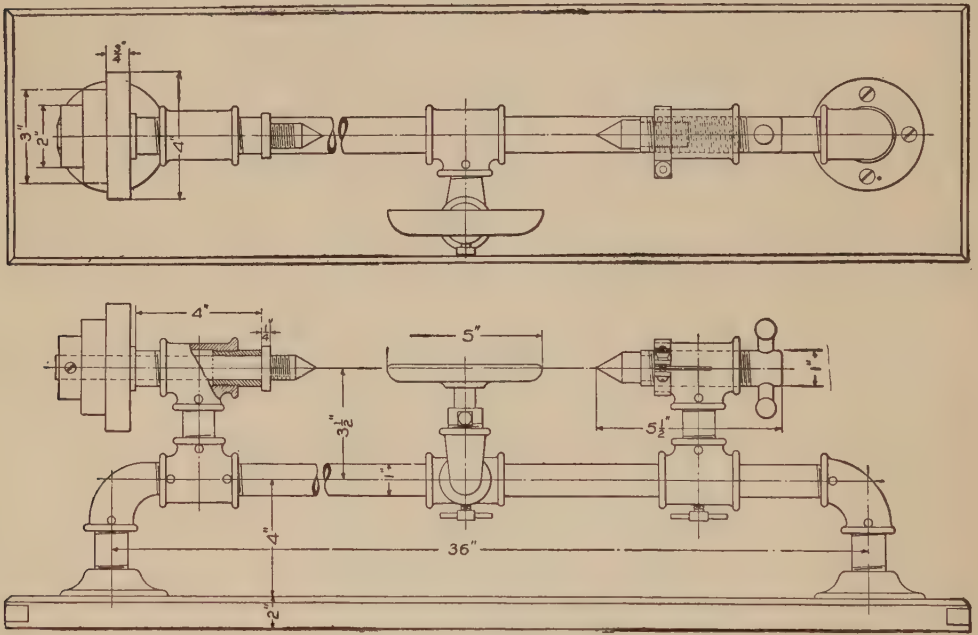


Fig. 1—Details of Lathe

lap on them the same as the joints in knock-down stovepipes. When the ends were hooked together, the spring worked as good as new. The heated portion did not affect the strength of the spring.—Contributed by Marion P. Wheeler, Greenleaf, Oregon.

¶ If you wish to know whether or not the door or telephone bell rings during your absence, place a little rider of paper or cardboard on the clapper in such a way that it will be dislodged if the bell rings.

sort. A good and substantial home-made lathe, which is suitable for wood-turning and light metal work, may be constructed from pipe and pipe fittings as shown in the accompanying sketch.

The bed of this lathe is made of a piece of 1-in. pipe, about 30 in. long. It can be made longer or shorter, but if it is made much longer, a larger size of pipe should be used. The headstock is made of two tees, joined by a standard long nipple as shown in Fig. 1. All the joints should be screwed

up tight and then fastened with $\frac{3}{16}$ -in. pins to keep them from turning. The ends of the bed are fixed to the base-board by means of elbows, nipples and flanges arranged as shown. The two bearings in the headstock are of brass. The spindle hole should be drilled and reamed after they are screwed in place in the tee. The spindle should be of steel and long enough to reach through the bearing and pulley and have enough end left for the center point. The point should extend about $1\frac{1}{2}$ in. out from the collar. The collar can be turned or shrunk on the spindle as desired. The end of the spindle should be threaded to receive a chuck.

The tailstock is also made of two tees joined by a nipple. The lower tee should be bored out for a sliding fit on the bed pipe. The upper one should be tapped with a machine tap for the spindle which is threaded to fit it. The

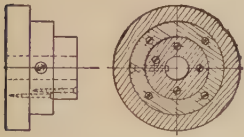


Fig. 2

spindle has a handle fitted at one end and has the other end bored out for the tailstock center.

Both the tailstock and the headstock centerpoints should be hardened. A clamp for holding the tailstock spindle is made of a piece of strap iron, bent and drilled as shown. It is held together by means of a small machine screw and a knurled nut. The tee should have a slot cut in it about one-half its length and it should also have one bead filed away so that the clamp will fit tightly over it.

The hand rest is made from a tapering elbow, a tee and a forging. The forging can be made by a blacksmith at a small expense. Both the lower

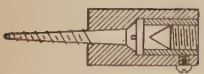


Fig. 3

tees of the hand-rest and the tailstock should be provided with

screw clamps to hold them in place.

The pulley is made of hardwood pieces, $\frac{3}{4}$ or 1 in. thick as desired. It is fastened to the spindle by means of a screw, as shown in Fig. 2, or a key can be used as well.

Care must be taken to get the tailstock center vertically over the bed, else taper turning will result. To do this, a straight line should be scratched

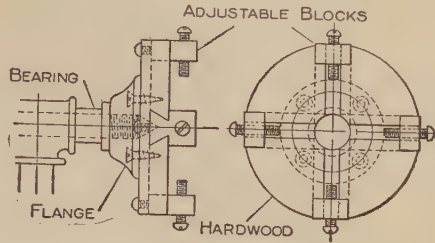


Fig. 4—Chuck

on the top of the bed pipe, and when the tailstock is set exactly vertical, a corresponding line made on this. This will save a great deal of time and trouble and possibly some errors.

The two designs of chucks shown in Figs. 3 and 4 are very easy to make, and will answer for a great variety of work.

As the details are clearly shown and the general dimensions given on the accompanying sketches, it should not be a difficult matter for the young mechanic to construct this machine.—Contributed by W. M. Held, Laporte, Indiana.

Holder for Flexible Lamp-Cord

The holder is made of a round stick—a piece of a broom handle will do—as shown in Fig. 1. It is about 1 in. long with two notches cut out for the strands of the cord. These holders are easily made and will answer the purpose almost as well as the ones made in porcelain. Painting or enameling will improve not only their appearance, but also their insulating properties. Sev-



Fig. 1

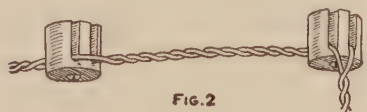


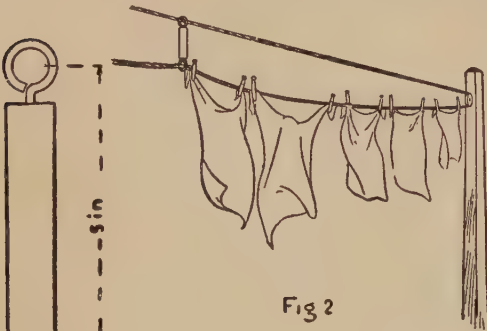
Fig. 2

Ceiling-Cord Holder

eral of them can be used along a line, as shown in Fig. 2.—Contributed by M. Musgrove, Boissevain, Man.

Support for Double Clotheslines

Anyone using a double clothesline over pulleys will find the arrangement shown in Fig. 1 for supporting the

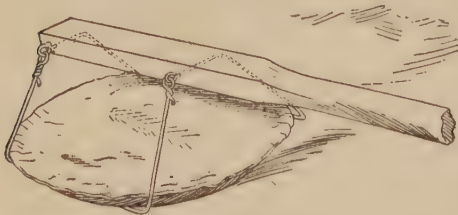


Holder on a Clothesline

lower line quite convenient. The support is made of a piece of $\frac{3}{4}$ -in. square or round wood which has a screw-eye turned into each end. The line is run through these screw-eyes as shown in Fig. 2.—Contributed by W. W. Up-DeGraff, Fruitvale, Cal.

Hot Pan or Plate Lifter

Unless a person uses considerable caution, bad burns may be suffered when taking hot pies from an oven. If one reaches in and takes hold of the pie pan with a cloth, the arm is liable to touch the oven door and receive a



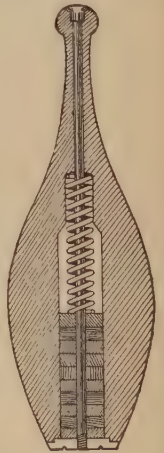
Lifter on Pie Pan

burn. To obviate this, I made the device shown in the sketch for lifting hot pie pans and plates. The handle is of pine about 18 in. long, and the two loops are made of heavy wire. The ends of the first loop of wire are put through the handle from the back, as

shown, and then bent so as to stand out at an angle. The second loop is hinged to swing free on the opposite side of the handle. In use, the hinged side of the loop is dropped under one edge of a plate or pan and the rigid loop is then hooked under the opposite side. The weight of the pan or dish draws the loops together and there is little or no danger of a spill. The same lifter will pick up any size of plate or pan from a saucer to the largest pie plates.—Contributed by E. J. Cline, Ft. Smith, Ark.

Weighting Indian Clubs

An ordinary Indian club can be fixed so that different weights may be had without changing clubs. Each club is bored to receive lead washers which are held in place by a spiral spring. A bolt is run through from the handle end and fastened with a round nut. The lead washers and spring slip over the bolt as shown in the illustration. Changing the number of washers changes the weight of the club.—Contributed by Walter W. White, Denver, Colo.



Venting a Funnel

When using a tight-fitting funnel in a small-neck bottle, trouble is usually experienced by the air causing a spill. This can be easily remedied by splitting a match in half and tying the parts on the sides of the stem with thread.—Contributed by Maurice Baudier, New Orleans, La.

A screw may be turned into hardwood easily, by boring a small hole and lubricating the screw threads with soft soap.

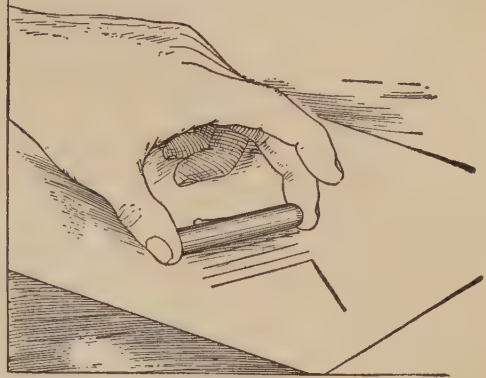
To Make "Centering" Unnecessary

For drilling a hole in a chucked piece, centering is just one operation too many, if this method is followed:

First, face off the end of the piece, making a true spot at least as big as the diameter of the drill. Put a center punch mark where the tool lines indicate the center of revolution. This serves as a rough guide for placing the drill between the tailstock center and the work as usual. Clamp a tool in the tool-post and, on starting the lathe, bring it in contact with the drill and keep it firmly so until the drill is in fully up to the lips. This prevents the drill from wobbling, and when once in true up to its size, it cannot change any more than under any other starting conditions. After being entered, the drill does not need the tool, which should be backed out of contact.

Fountain Pen Cap Used as a Ruler

When it is necessary to draw a short line and there is no ruler at hand, take



Ruling Lines

off the cap of your fountain pen and use it as a ruler. If the cap is fitted with a retaining clip, all the better, as this will prove a safeguard against slipping.

Vanishing Handkerchief Trick

The necessary articles used in performing this trick are the handkerchief,



vanishing wand, a long piece of glass tubing, about $\frac{1}{2}$ in. shorter than the wand, and a paper tube closed at one end and covered with a cap at the other, says the Sphinx. The handkerchief rod, shown at C, is concealed

in the paper tube A before the performance. The glass tube B, after being shown empty, is put into the paper tube A, so that the handkerchief rod now is within it, unknown to the spectators. The handkerchief is then placed over

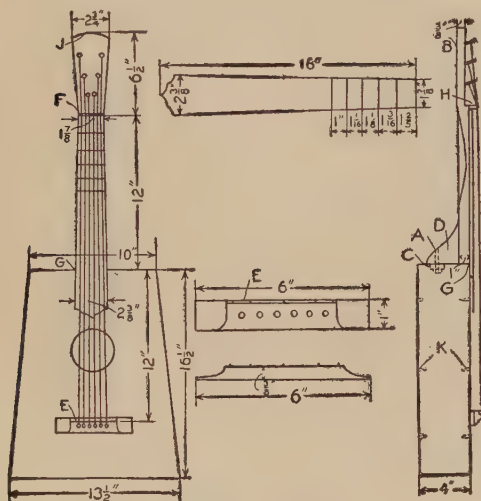
the opening of the tube and pushed in by means of the wand. In doing this, the handkerchief and the rod are pushed into the wand, as shown in D. After the wand is removed, the cap is placed over the paper tube, and this given to someone to hold. The command for the handkerchief to vanish is given, and it is found to be gone when the glass tube is taken out of the paper cover. This is a novel way of making a handkerchief vanish. It can be used in a great number of tricks, and can be varied to suit the performer.

Removing Glass Letters from Windows

Glass letters are removed in the same way as metal letters, by applying caustic soda or potash around the edges of the letters. As the cement softens, manipulate the point of a pocket knife under the edges of the letter until the caustic works completely under and makes it easy to lift the letters. With care and patience, every letter may be thus taken off without breakage.

A Guitar That Is Easy to Make

A guitar having straight lines, giving it an old-fashioned appearance, can be made by the home mechanic, and if care is taken in selecting the material, and having it thoroughly sea-



Details of Guitar

soned, the finished instrument will have a fine tone. The sides, ends and bottom are made of hard wood, preferably hard maple, and the top should be made of a thoroughly seasoned piece of soft pine. The dimensioned pieces required are as follows:

- 1 Top, $\frac{3}{8}$ by 14 by 17 in.
1 Bottom, $\frac{3}{8}$ by 14 by 17 in.
2 Sides, $\frac{3}{8}$ by $3\frac{5}{8}$ by $16\frac{3}{4}$ in.
1 End, $\frac{3}{8}$ by $3\frac{5}{8}$ by $13\frac{5}{8}$ in.
1 End, $\frac{3}{8}$ by $3\frac{5}{8}$ by 9 in.
1 Neck, 1 by $2\frac{1}{8}$ by $18\frac{1}{2}$ in.
1 Fingerboard, $\frac{3}{8}$ by $2\frac{5}{8}$ by 16 in.

Cut the fingerboard tapering and fasten pieces cut from hatpins with small wire staples for frets. All dimensions for cutting and setting are shown in the sketch. The neck is cut tapering from G to F and from J to F, with the back side rounding. A draw-knife is the proper tool for shaping the neck. Cut a piece of hard wood, $\frac{1}{4}$ in. square and $1\frac{7}{8}$ in. long, and glue it to the neck at F. Glue the fingerboard to the neck and hold it secure with clamps while the glue sets.

The brace at D is 1 in. thick, cut to any shape desired. The sides are

glued together and then the front is glued on them. Place some heavy weights on top and give the glue time to dry. Fasten pieces of soft wood in the corners for braces. Glue the neck to the box, making it secure by the addition of a carriage bolt at A. A small block C is glued to the end to reinforce it for the bolt. Glue strips of soft wood, as shown by K, across the front and back to strengthen them. The back is then glued on and the outside smoothed with sandpaper.

Make the bottom bridge by using an old hatpin or wire of the same size for E secured with pin staples. Glue the bridge on the top at a place that will make the distance from the bridge F to the bottom bridge E just 24 in. This dimension and those for the frets should be made accurately. Six holes, $\frac{3}{16}$ in. in diameter, are drilled in the bottom bridge for pins. The turning plugs B and strings can be purchased at any music store.—Contributed by J. H. Stoddard, Carbondale, Pa.

Greasing the Front Wheels of an Automobile

The front wheel bearings of an automobile can be greased without removing the wheels in the following manner: Remove the hub caps and fill them with heavy grease and then screw them in place. Continue this operation until the grease is forced between all the bearings and out through the small clearance on the opposite side of the wheels. This should be done at least once every month to keep bearings well lubricated and free from grit. Dirt cannot enter a well filled bearing as easily as muddy water can enter a dry bearing.—Contributed by Chas. E. Frary, Norwalk, O.

Mold on wallpaper can be removed at once by applying a solution of 1 part salicylic acid in 4 parts of 95-percent alcohol.

How to Make a Nodding Doggie

By W. P. MOTT

THE nodding doggie is an amusing toy for small children, and is not at all difficult to construct, neither is any elaborate tool equipment necessary. As may be gathered from the illustrations, it is made in three parts, the body and the movable head and tail. Two lengths of cord are attached to the movable parts, tied together some distance below the toy and provided with a small weight at the lower end. When the body of the dog is held in the hand by means of fingergrrips, and the weight on the end of the strings is allowed to swing like a pendulum the dog nods his head and wags his tail, in a manner very lifelike to the children, as shown in Figs. 1 and 2.

The parts for the toy can be cut from any easily worked soft wood. The simplest way to make the pieces is to cut them from wood of the proper thickness

to be cut into shape is laid out in $\frac{1}{2}$ -in. squares, the design can very readily be copied from the drawing.

The head and tail are pivoted in the body on small wire nails, care being taken to round off the corner of the body under the neck so that the head can swing downward freely when the toy is operated. When the parts have been assembled, the dog is mounted on a platform or base, $5\frac{3}{4}$ in. long, $1\frac{1}{2}$ in. wide and $\frac{3}{16}$ in. thick. Small slots are cut in this to take the small projections on the dog's feet, and the latter are then glued into the slots. The handgrip consists of two strips of $\frac{3}{16}$ -in. wood, $\frac{1}{2}$ in. wide and 4 in. long, glued or nailed to a $\frac{1}{2}$ by 1 by $1\frac{1}{2}$ -in. block, the ends of the strips and the block being joined flush, and the assembly then nailed to the underside of the platform, a little to the rear of the front feet and flush with the back.

The cords are 2 ft. 6 in. long and are passed through small holes drilled on the center line of the platform; one of these is drilled $\frac{1}{2}$ in. in front of the handgrip and the other $\frac{3}{4}$ in. behind it. The method of attaching the upper ends of the

cords is clearly shown in Fig. 4. The other ends of the cords are joined together and a weight of about 3 oz. hung to them.

In the original, a small nut was mounted on the front end of the platform so that the dog



Fig. 1

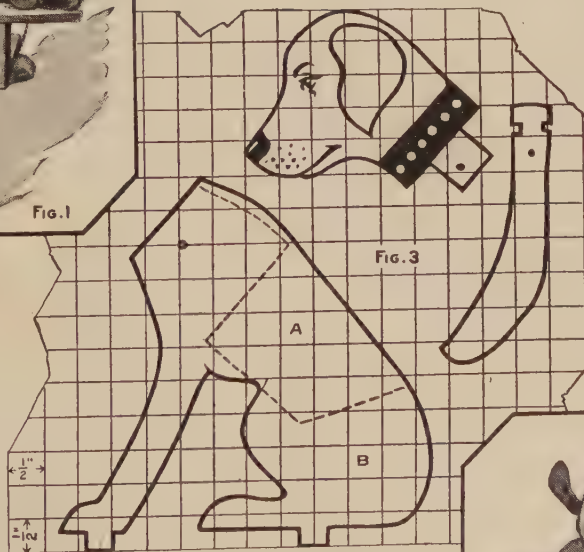


Fig. 3

with a coping saw or fretsaw, but, if these are not at hand, a good job can still be done with nothing more than a pocket-knife. The body is made in three parts; two like the full-line shape shown in Fig.

3 and one of the shape shown by the dotted lines and marked A, in the same figure. The three parts are then assembled as indicated in Fig. 4, so that a slot is left at each end of the body for the head and the tail. Fig. 3 details the parts laid out to scale, and if the wood

Figs. 1 and 2 Show How the Nodding Doggie Works; the Center Drawing Is a Scale Layout of the Parts

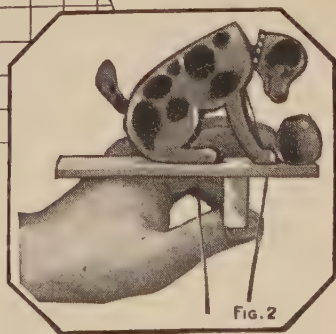


Fig. 2



Assembly of the Parts of the Nodding Doggie, Showing How the Cords Are Attached to the Head and Tail and Led through the Platform



appeared to be drinking from it, but this may be omitted if desired, or any similar device substituted for it. The coloring, too, may suit the maker. The original coloring is walnut with ears and muzzle burned to the correct hue with a hot

iron. By using any of the enamel paints that are made for toys and decorative articles, an attractive toy can be made.

Warm Up Engine as Soon as Possible Experts Advise

Experts of the bureau of standards have found that hot water in the jacket of the automobile engine helps reduce the thinning of the oil in the crankcase. In a cool cylinder, it is explained, the fuel is only partly vaporized, and the unvaporized gasoline does not burn. Instead, it remains in the cylinder and mixes with the oil, and is carried into the lubricating system of the engine. After a period of operation, the oil becomes so diluted that its lubrication value is considerably lowered, and it has to be replaced. A very small portion of gasoline suffices to produce

serious dilution in the crankcase. Everything possible should be done to warm up the engine quickly when starting, as dilution has been found to take place much more rapidly when starting than when the engine has reached its normal operating temperature. In fact, the consumption of gasoline when starting may be as much as twenty times the normal rate, and much of the unburned gasoline gets into the oil. Dilution is also made worse by frequent stopping and starting of the engine, with alternate short periods of warming up and cooling off. Dilution may also be lessened by high temperature of the crankcase oil, as heat tends to separate the gasoline from the oil.

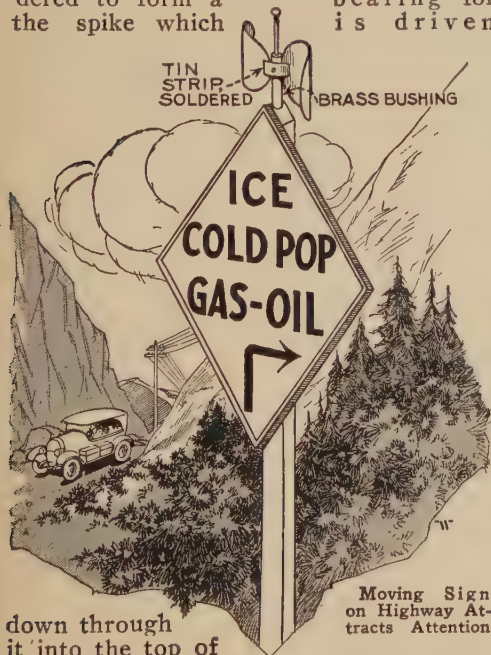
Making Case for Fish Rod

Get a large cane, such as is used to roll rugs on, and saw it off about 4 in. longer than the fishing rod. Split it down the center, cut out all the joints, and clean and smooth the inside with sandpaper. A handle can then be riveted to one of the halves. Now glue the sections together again and wrap the case with heavy thread, in the way a fly rod is wrapped. In one end of the case a cork is glued, and a loose cork is used in the other. If desired, the completed case may be enameled or varnished to make a better appearance.

—Max K. Hortin, Oakley, Utah.

Moving Sign Attracts Attention

Many highways are lined with colored display signs of about every description. Growing accustomed to the more ordinary ones, it takes a decided departure to command attention. Just west of Omaha, Nebr., on one of the main roads, one may see a whirling red and black sign that announces ice-cold pop, gas and oil just around the bend. The sign itself is conspicuous, but the colors add to this considerably. Closer investigation shows the mechanism to be extremely simple. Two can covers, cut from 1-gal. cans, are soldered to a heavy strip of tin. To this a small bushing or tube is also soldered to form a bearing for the spike which is driven



down through it into the top of the support. The will turn in a light breeze.

Moving Sign on Highway Attracts Attention

Novel Feather-Duster Incubator

A New Jersey chicken breeder has succeeded in hatching a record number of eggs in the novel homemade incubator



Novel Incubator Consisting of Feather Dusters and Electric Lamp

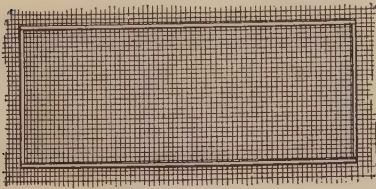
shown in the photo. It consists of an ordinary wooden box divided by a partition. The eggs are placed in one section covered by a board, to which four feather dusters, with the handles cut off, are attached as shown. An electric lamp, inclosed in a guard, is set centrally between the dusters, the cord passing through a hole in the cover. The heat of the lamp is retained by the dusters and, when the eggs are hatched, the new-born chicks have an artificial hen sitting on them. The other section provides an open-air yard where the older chicks may be fed and exercised.

Repairing Organ Bellows

I was called upon to clean and repair a small church organ here, and found the rubber bellows cloth worn threadbare in many places, which made the instrument very difficult to play. New cloth could not be had except at the factory in Illinois, and I knew it to be very difficult to put in place satisfactorily. So I tried the following scheme, which has proved entirely successful after two years' use: I cleaned the bellows thoroughly with gasoline, and when dried, gave it a coating of rubber cement.—M. A. Carty, Bremerton, Wash.

A Home-Made Elderberry Huller

As we had only one day to pick elderberries, we wanted to get as many of them as we could in that time. We could pick them faster than they could



FRAME WITH WIRE
Fig. 1



END
Fig. 5

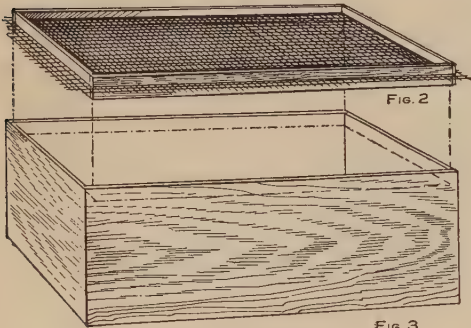
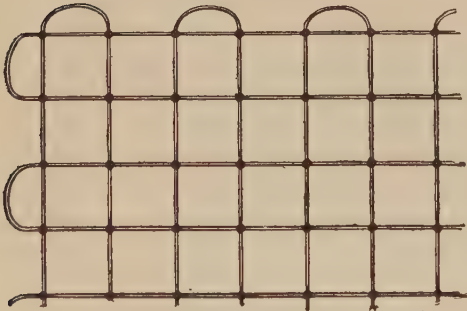


Fig. 3



NATURAL SIZE OF WIRE
Details of the Elderberry Huller
Fig. 4

be hulled by hand so we made a huller to take along with us to hull the berries as fast as they were picked. We procured a box and made a frame, Fig. 1, to fit it easily, then made another frame the same size and put a piece of wire mesh between them as shown in Fig. 2, allowing a small portion of the mesh to stick out of the frames. The top frame would keep the berries from rolling or jumping off, and the bottom frame kept the wire mesh and frame from being shaken off the box. The projecting edges of the mesh would

keep the frame on the top edge of the box. The top view of the frame is shown in Fig. 1 and the end in Fig. 5, and the box on which the frame rests in Fig. 3. The actual size of the wire mesh used is shown in Fig. 4. One person could hull with this huller as many berries as two persons would pick.—Contributed by Albert Niemann, Pittsburg, Pa.

How to Make a Bulb on a Glass Tube

As a great many persons during the winter months are taking advantage of the long evenings to experiment in one way or another, the following method of forming bulbs on glass tubes may be of interest. A common method is to heat the part to be formed and by blowing in one end of the tube gradually expand the glass. This way has its drawbacks, as many are not sufficiently familiar with the work to blow a uniform blast, and the result is, a hole is blown through the side of the tube by uneven heating or blowing.

A good way to handle this work, is to take the tube and 1 or 2 in. more in length than the finished article is to be and place one end over an alcohol flame, and by holding a spare piece of tubing against the end allow them both to come to a melting heat, then pull apart and instead of breaking off the long thread thus formed, simply hold it in the flame at an angle of 45 deg. and melt it down and close the end at the same time. Close the other end with the same operation; this makes the tube airtight.

Gradually heat the tube at the point where the bulb is to be formed, slowly turning the tube to get a uniform heat. The air inside of the tube becoming heated will expand, and the glass, being softer where the flame has been applied, will be pushed out in the shape of a bulb. A great deal of care should be taken not to go to extremes, as the bulb will burst with a loud report if the heat is applied too long. The best results are obtained by heating the glass slowly and then the bulb can be formed with regularity. This is an

easy way to make a thermometer tube. After the bulb is formed, the other end of the tube can be opened by heating, drawing out and breaking the thread like glass.—Contributed by A. Oswald.

How to Make a Sconce

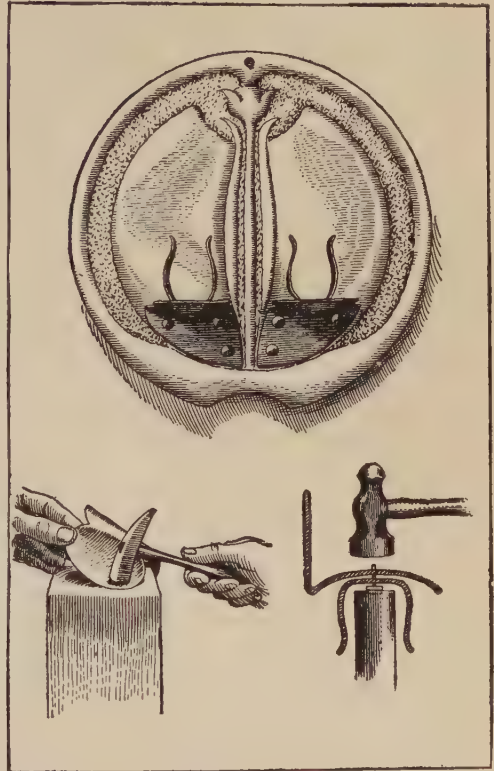
A sconce is a candlestick holder, so made that it has a reflector of brass or copper and is to hang upon the wall. The tools necessary are a riveting hammer, file, metal shears, rivet punch, flat and round-nosed pliers, screwdriver and sheet brass or copper No. 23 gauge.

To make the sconce proceed as follows: First, cut off a piece of brass so that it shall have $\frac{1}{2}$ in. extra metal all around; second, with a piece of carbon paper, trace upon the brass lines that shall represent the margin of the sconce proper, also trace the decorative design; third, with a nailset make a series of holes in the extra margin about $\frac{3}{4}$ in. apart and large enough to take in a $\frac{3}{4}$ -in. thin screw; fourth, fasten the metal to a thick board by inserting screws in these holes; fifth, with a twenty-penny wire nail that has had the sharpness of its point filed off, stamp the background of the design promiscuously. By holding the nail about $\frac{1}{4}$ in. above the work and striking it with the hammer, at the same time striving to keep its point at $\frac{1}{4}$ in. above the metal, very rapid progress can be made. This stamping lowers the background and at the same time raises the design. Sixth, chase or stamp along the border of the design and background using a nail filed to a chisel edge. This is to make a clean sharp division between background and design. Seventh, when the stamping is complete remove the screws and metal from the board and cut off the extra margin with the metal shears. File the edges until they are smooth to the touch.

The drip cup is a piece of brass cut circular and shaped by placing the brass over a hollow in one end of a block. Give the metal a circular motion, at the same time beat it with a round-nosed mallet. Work from the

center along concentric rings outward, then reverse.

The candle holders may have two, three, four, or six arms, and are bent to shape by means of the round-nosed



Completed Sconce
Shaping the Holders

Riveting

pliers. The form of the brackets which support the drip cups may be seen in the illustration.

Having pierced the bracket, drip cup, and holder, these three parts are riveted together as indicated in the drawing. It will be found easier usually if the holder is not shaped until after the riveting is done. The bracket is then riveted to the back of the sconce. Small copper rivets are used.

It is better to polish all the pieces before fastening any of them together. Metal polish of any kind will do. After the parts have been assembled a lacquer may be applied to keep the metal from tarnishing.

Building a "SCENIC" COASTER

by K. D. Reynolds



HERE is the newest thriller of the youngsters' world—the homemade "scenic" coaster. Built in the hills of North Berkeley, Calif., by two boys aged but 15 and 17, it is guaranteed by the kids of the neighborhood to provide more thrills per curve and hump than the most ambitious coaster that can be found in an amusement park.

Richard Leonard and Ysidro Orpano, the "promoters" of the enterprise, selected a vacant lot that slopes abruptly to the shores of San Francisco bay as the site of their coaster, then they started gathering the lumber, consisting mainly of scraps from new houses that were being built near by, and lumber from an old garage torn down in the vicinity. The cost of the necessary nails and the upkeep of the coaster have been provided for by charging the passengers one cent a trip. And what a cent's worth the juvenile passengers get! There are ten gliders or cars on which the riders go flying down the hill, through switches, around curves



"The Race through the Grass" in Full Swing;
Below, Bottom View of Car

and over humps where one shoots through the air for a distance of from two to four feet, depending on the weight of the passenger, before alighting again on the rails and speeding onward. Farther on, the rider runs under a trestle over which other gliders are rushing, and now over a level crossing, just missing another car approaching on another track!

There are 960 feet of track in all, and there

are several miniature stations along the route that serve as storehouses for the paraffin used to "grease" the slide. The cost of the latter is also taken care of by the income derived from the neighborhood's pennies. When this article was written, the builders had collected over \$10, representing more than 1,000 rides.

The track is built of 6-in. boards, with laths nailed down the center to make a guide rail. The passenger rides on a simple sledlike car that has two iron-shod runners at each end, spaced far enough apart to slide easily along the lath. The

accompanying drawings and photos will give any boy who wants to emulate the builders a good idea of the construction of the cars and the track, which, of course, can be modified in any desired way to suit the material at hand; it is difficult to see, however, how it could be made much simpler. A little paraffin rubbed on the track and guide rail at the start of the day gives plenty of speed to the ride.

The main thing to be observed in building the track is that if any trestles are used they must be strong enough to support the weight of the heaviest person who is likely to use the coaster. Use the heaviest lumber of that available for the trestles and be sure that it is well braced in every direction. The cars can be provided with wheels if desired; these may be taken from old roller skates and this should provide even more speed than the sled runners. The skates could be used "as is," and the center guide rail on the track replaced by laths nailed at each side, so as to form a groove for the roller-skate wheels to run in, and prevent them from jumping from the track.

Not only the children use the "Race through the Grass," for, on the day when these pictures were taken, one full-grown man, who was at least 40 years of age, went shooting down that slide at about 30 miles an hour, yelling like an Indian every foot of the way, evidently enjoying it immensely. The writer rather envied him.

How to Care for Shoes

The life of shoes may be considerably prolonged by the exercise of a little care. It is a curious fact that if a wet shoe is placed close to a fire, the interior of the sole is sometimes completely ruined before the surface of the leather shows any appreciable signs of injury. The temperature of a steam radiator is also sufficient to injure a wet shoe sole. Shoes should be dried slowly, and, if possible, shoe trees should be inserted in them to prevent them losing their shape and becoming uncomfortable. It is therefore a matter of economy to keep two or more pairs of shoes and wear them in rotation. Some leather manufacturers claim that two pairs of shoes worn alternately will outlast three pairs worn consecutively.

Shoes, when not in use, should be stored where there is circulation of air. Perspiration is bad for leather, and shoes wet in this manner should be dried as soon as possible.



Details of the Construction of the Track and Drawing Showing Underside of Car or Sled; Above, the Car at the Top of the Hill, Ready for the Dash down the Slide

Mowing Lawn Banks

With the aid of an additional handle on the lawnmower, the difficulty of cutting grass on banks is considerably reduced



Additional Handle on Lawnmower Reduces Difficulty of Cutting Banks

as it permits the worker to remain on top of the lawn yet hold the mower at the proper angle. The extra handle, about 8 ft. long, is screwed to the underside of the regular handle, and a brace is nailed between the two, as shown. The length of this brace depends on the slope of the bank; the steeper the bank the longer it will have to be in order to hold the mower at the correct cutting angle. When cutting the flat part of the lawn, the extra handle and the brace are removed.—Sam E. Connor, Auburn, Me.

Removing Rubber Tissue from Garments

When rubber tissue has been employed in the temporary repair of a garment, one often finds that it is almost impossible to remove it so that permanent repair work can be done with needle and thread. However, by sponging the spot with a cloth moistened with gasoline, the tissue will be dissolved so that it can be removed entirely without damage to the fabric. For the same reason, repairs cannot be made with rubber tissue immediately after a garment has been cleaned with gasoline. Even though it appears to be perfectly dry, the article should be aired for a day or so, or sufficient fumes of the gasoline will remain within the fibers to resist the attachment of the tissue.—G. E. Hendrickson, Argyle, Wis.

Chasing Flies with a Fan

By using the electric fan the fly swatter can be done away with and the house cleared of flies with very little work.

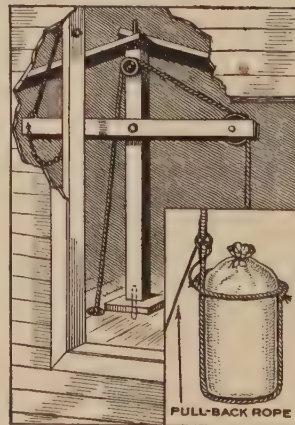
Raise a window halfway up, and draw the shade on it halfway down. Draw the shades on all the other windows down completely, thus allowing the light to come in only through the open window. Place the fan on a table or chair a few feet away from the window, facing it, and start the fan so that the draft will blow out of the window. The flies make for the light, and as soon as they come into the current of air from the fan they "hit the breeze" out of doors.—W. C. Martin, Cleveland, Ohio.

Diffusing Screen for Enlarging Lantern

A diffusing screen for an enlarging lantern is expensive and cannot be obtained everywhere. A good substitute can easily be made in the following way: Take an unexposed sheet of film from a film pack, and place it in the hypo solution without exposing it to light. After leaving it in this bath for about twenty minutes, remove and wash it like any other film. After drying, it will be found to make a satisfactory diffusing screen.—W. J. Latter, Halifax, N. S.

A Hoist for Filled Sacks

One man with the hoist illustrated can lift more sacks of wheat or other grain into the mow of a barn faster and with less exertion than several carrying the bags on their shoulders. A pivoted post is set



up vertically at the proper position inside the mow door; a horizontal arm is attached to it by a single bolt and is kept in position by means of a $\frac{1}{2}$ -in. iron rod that is fixed to eyebolts in one of the studs at the side of the door and in the end of the arm. When the lifting rope passes up and the ring comes against the pulley, the arm will be forced down at the opposite end. It

should be noted that the distance between the inner end of the arm is three feet or more from the studding, and, as the iron rod is attached to both, then, when the arm is forced down, it is also caused to swing toward the studding so that the sack of grain will be swung inside. The loop which holds the sack in place during the hoisting operation is made sufficiently large to be easily passed over the top of the sack; it holds the sack so, that though it may be securely tied when filled, there is little danger of its coming open. When the sack has reached its position in the loft, the pull-back rope is pulled by the man on the wagon below and the loop is lifted from the top of the sack so that it rolls free. The lifting rope and arm are returned to position for another sack as the pull-back rope is operated.

Effective Hawk Trap

When a hawk flies down over a chicken yard, the chickens scuttle for shelter, and the hawk usually alights on some near-by post from which to make its final pounce on the victim. Taking advantage of this,



Effective Method of Trapping Hawks in Farm Yard

a Minnesota farmer mounted a spring trap on each of three posts in his yard, as shown in the illustration, and found this method much more effective than trying to shoot the hawks. Sheet-metal flanges were tacked around the posts to prevent cats and squirrels from climbing up.—A. C. Brundage, Rochester, Minn.



Window Weights Lashed to the Bottom Rail of the Walker Make It Safer for the Baby

Making the Baby Walker Safe

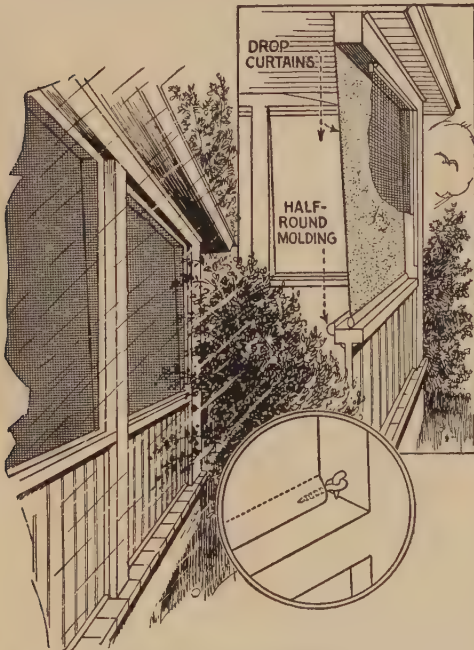
With the ordinary kind of baby walker it sometimes happens that the child reaches over the top rail and falls, which is especially liable to happen when the walker is used outdoors on uneven ground. The trouble can, however, easily be prevented by tying two window weights to the lower rail, over the rear casters. This is a job that can easily be done in a few moments and will save the mother a great deal of worry.—Mrs. V. S. Martin, Detroit, Michigan.

Cleaning Paintbrushes

By using the following method paintbrushes can readily be cleaned and kept soft and pliable without keeping them in oil or water. When finished with the brush, clean it in gasoline; about two-thirds of a cupful is enough. Pour some clean gasoline on the brush and hold it in front of the nozzle of a garden hose or other strong stream of water, turning the brush around several times to wash out the gasoline. With the removal of the gas, every trace of the paint will also disappear. The brush is then laid away to dry, and it will be soft and clean for the next job. Even if used in black paint a brush will not soil a clean piece of paper when rubbed over it, after having been thoroughly cleaned and dried in this way.—Orin C. Watkins, Salem, Oreg.

Rain-Proof Sleeping Porch

It often happens during a storm that the rain strikes the curtains on the sleeping porch and runs down on the inside,



Strips of Molding Nailed on Edge of Railing Make Sleeping Porch Rain-Proof

forming puddles of water on the floor. This trouble can easily be prevented by arranging the curtains as shown in the illustration. They are brought down to the plate of the railing, or to the floor if there is no railing, and a strip of molding or other thin wood is nailed to the top edge of the plate or to the floor on the inside of the curtain as indicated. This makes it impossible for the rain to get on the porch. The curtains are, of course, fastened at the bottom in the usual way, as shown in the insert, a screw being driven into the end of the pole and hooked on an L-hook, driven into the porch post, as shown.—J. G. Pratt, Washington, D. C.

Repairing Auto Curtain Fasteners

On many open cars the curtain fasteners are attached to the wood rail along the top of the body by two wood screws. The rail often dries out and splits, and the screw holes become rusty and enlarged, causing the fasteners to come off. This trouble can be prevented by bolting each fastener to a 2-in. strip of flat iron and screwing this to the rail. The upholstery

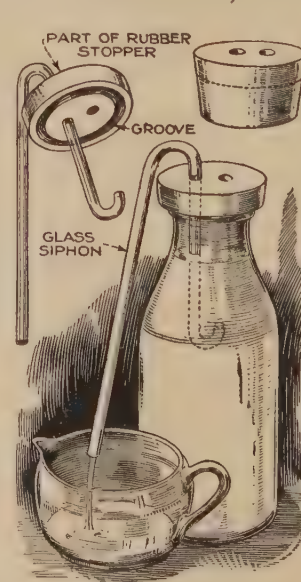
binding tape is first loosened at the points where the fasteners are to be attached, holes are drilled for the nuts and bolt ends where the old screw holes are, and the strips then screwed down on the rail.—E. T. Gunderson, Humboldt, Iowa.

Preventing Bed from Marring Baseboard

Marks and cuts on a bedroom baseboard, due to moving the bed around, can be prevented by placing a narrow piece of hardwood on the floor along the edge of the baseboard, behind the legs of the bed. This forms a bumper for the casters, and it is then impossible to push them against the wall. The piece of wood may be painted or varnished and, in any case, is not likely to be noticed by the casual observer.—Charles A. Goddard, Los Angeles, Calif.

Separating Cream from Milk

A separator that siphons off the cream from a bottle of milk and automatically stops the flow when the cream line is reached, is shown in the illustration, and can be made for about the price of a bottle of milk. All that is necessary is a No. 11 2-hole rubber stopper, and a 15-in. length of $\frac{3}{16}$ or $\frac{1}{4}$ -in. glass tubing. Two bends are made in the tubing, one about 8 in. from the end, and another $3\frac{1}{2}$ or 4



in. from the first. The tubing can be bent by holding it in a gas flame or that of an alcohol lamp, turning the tube in the fingers and moving it back and forth in the flame so that it is heated for about 1 in. of its length. When it begins to bend of itself it is taken by the ends and bent gently, at the same time moving the

point where it is bending most out to the edge of the flame. By bending slowly and spreading the bend over $1\frac{1}{2}$ in. of the tube

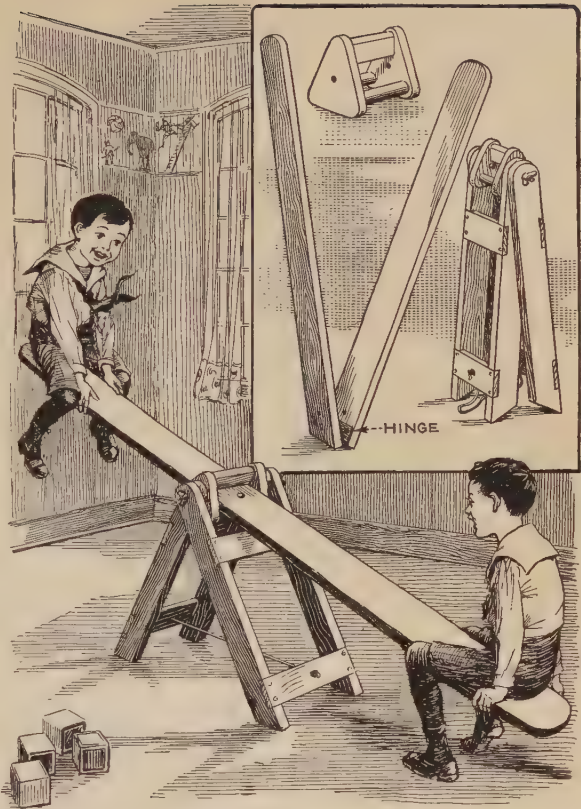
a smooth even bend will result. The tubing is broken off just above the second bend by scratching it on one side with a three-cornered file, grasping it on either side of the scratch with the fingers and giving it a quick snap. The rubber stopper is cut with a very sharp knife to leave a section $\frac{1}{16}$ in. thick; this is laid over the mouth of the bottle and the outline of the mouth traced on the rubber. Concentric with this another circle is drawn, $\frac{3}{8}$ in. smaller in radius; now, with a sharp knife a circular groove is cut around the stopper, about $\frac{1}{16}$ in. deep, between the circles. The stopper and tube are then assembled as shown, and put in place so that the short arm comes to the cream line. Close the open hole in the stopper with the thumb and thrust sharply downward, then withdraw the thumb. The sudden pressure starts the flow of the siphon and it keeps on running until the cream line is reached.

Platform for Washing Autos

For washing automobiles, a concrete platform of the kind shown in the photo will be found neat as well as useful. The water dripping from the car is caught in the tracks and is drained through holes into a sump, thus preventing the dirty water from getting all over the floor. An incline, which is similarly grooved and is wider near the floor to make it easier to guide the car onto it, leads up to the platform. The edges of the concrete are, of course, rounded to prevent injury to the tires.—C. W. Geiger, San Francisco, Calif.



Elevated Concrete Runway Aids in Washing Car and Drains Away Muddy Water



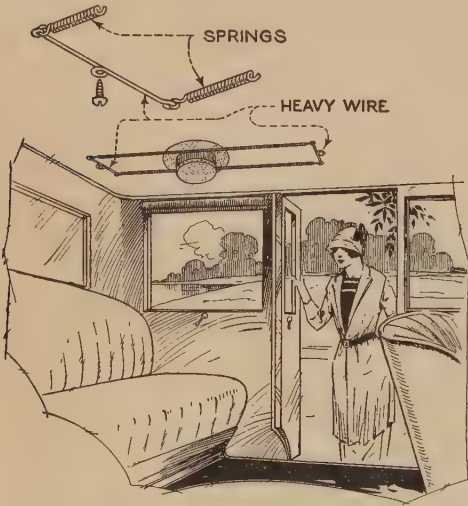
Collapsible Seesaw for the Playroom That Can Be Stored in a Small Space When Not in Use

Folding Seesaw Amuses Children Indoors

For the recreation and amusement of children during rainy weather when they cannot play outdoors, a seesaw of the kind shown in the drawing is especially suitable for the playroom. It is a folding affair so that it can readily be stored away in a small space when not in use, and its dimensions permit it to be carried around without much trouble. It consists of the three parts, shown in the detail. The board, of 2-in. material, well planed and about 6 ft. long, is hinged at the center with an ordinary door hinge securely bolted to it so that the leaves are on the top side. The frame is made of 1 and 2-in. material with a length of rope at the bottom to keep the legs from slipping too far apart. The pivot of the seesaw is made as shown in the detail, and bolted to fit the top of the frame so that it can swing freely. To add to the appearance of the toy a couple of coats of paint should be applied.—Geo. K. Heist, Winchester, Va.

Sedan Hat Rack Made from Springs

Hats are not usually needed when riding in a sedan, and when carried on the lap, are rather a nuisance. A novel hat rack, which holds the hats entirely out of



Hats Held Conveniently on a Spring Holder Attached to the Top of a Sedan

the way, is shown in the drawing. Wire braces are bent to the shape shown and are screwed to the ribs supporting the top. Two screen-door springs are then hooked to the ends of these braces, which have eyes formed at the ends, about 6 in. apart, so that the space between the springs will easily accommodate the crowns of the hats. The hats are slipped with the rims under the springs as indicated, and will be held in this position securely.—Frank Harazin, New York City.

Applying Undercoat for Enamel

One of the reasons that some enamel jobs do not turn out satisfactorily when done by an amateur, is that no attention is paid to the color or tint of the undercoating applied. Many professional interior finishers even commit this error, so there is some excuse for the amateur. The tint or color of the undercoating should be as close a match as possible to the enamel to be applied over it. There is another excellent reason for carrying out the above suggestion; in cleaning the enameled surface from time to time, it is bound to wear or become chipped. If the undercoating is of a different color it will show through the chipped or worn parts and, in that case, there will be no other remedy than repainting.

Bird Houses That Grow from Seeds

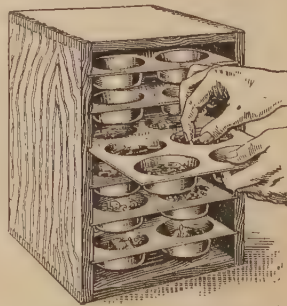
Weatherproof homes that the birds like and use may be made in unlimited number by simply planting a package of "dipper gourd" seeds along a fence; then, when the fruit is ripe, remove from vines, boil in a washboiler, scoop out center through small opening, and later run a wire through the top of neck for a hanger. Push a peg in below the hole for a perch. Allow them to dry for a few weeks. When dried, paint the inside and outside, and leave in the attic or anywhere handy until spring, when the birds are expected. The bird houses must be "weathered" so that there is no smell of paint, and they should be put in place before the first birds come.—Mrs. V. S. Martin, Detroit, Mich.

Repairing Holes in Water Pipe

A small hole in a low-pressure water pipe may be repaired in the following way: Take a piece of tinfoil of the type wrapped about certain brands of tobacco and confections, shape it into a sharp-pointed cone and tap it, point first, into and over the hole with a light hammer. Then wrap tightly with friction tape. A repair of this kind has been effective for over two years on an iron pipe carrying water at a pressure of 20 pounds.

Cheap Cabinet for Small Parts

A handy rack for holding small nails, screws, cotter pins, and the like, can be made in the following way: Obtain a



stout wooden box, 7 in. wide, 10 in. deep, and about 16 in. long, inside dimensions, and half a dozen biscuit tins, which are usually rectangular in shape, about $7\frac{1}{4}$ by $10\frac{1}{2}$ in.

in dimensions, and have six circular depressions, $3\frac{1}{2}$ in. in diameter. Remove the bottom of the box and saw grooves, $\frac{1}{2}$ in. wide and $\frac{1}{4}$ in. deep and spaced about 2 in. apart, in the sides as shown. This can be done easily if the bottom is temporarily removed. Nail on the bottom again and slip the pans into the slots. They can be used as drawers or can be taken out separately.

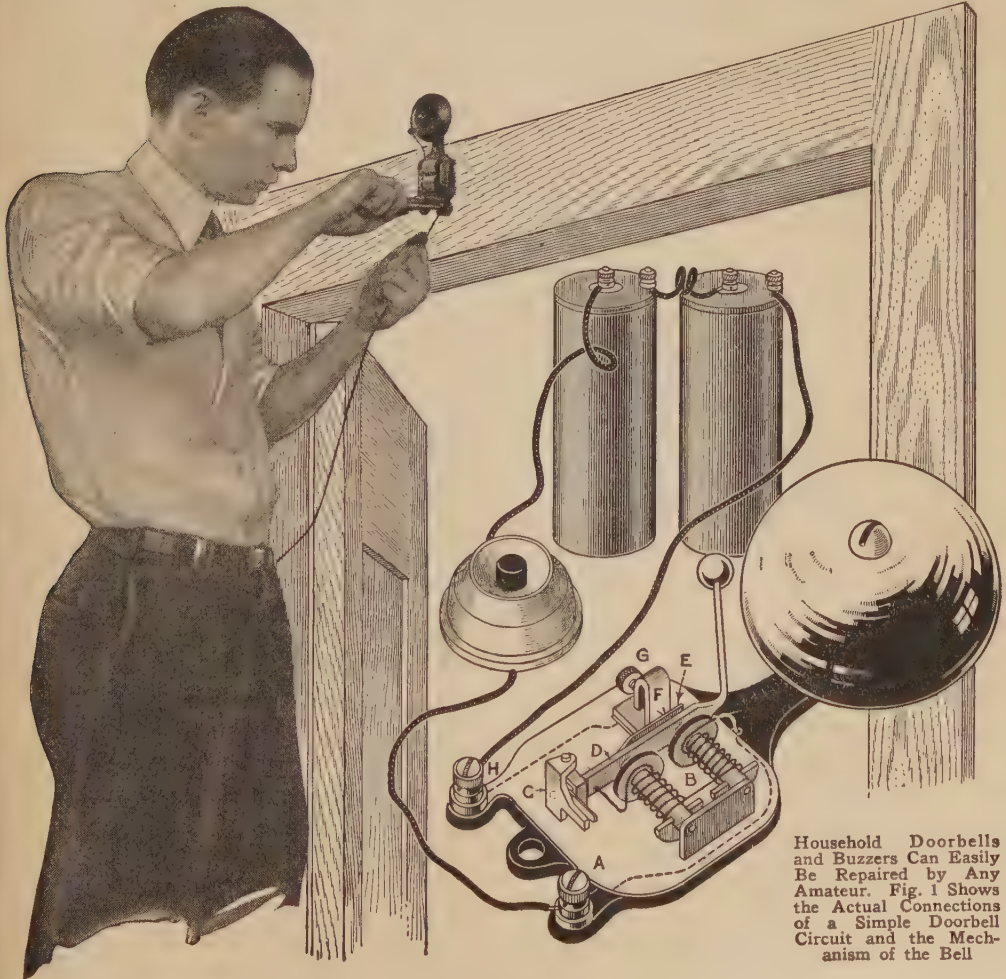


Fixing Doorbells and Buzzers

By E. R. HAAN

THE ordinary troubles experienced with electric doorbells or buzzers can easily be taken care of by the amateur without calling in an expert. All that is necessary is a little knowledge of the operation and construction of the apparatus and the ability to handle such common tools as screwdriver, a pair of pliers and a knife.

Both operation and construction are easily followed by reference to Fig. 1, which shows a battery-operated bell. Two dry cells are connected in series, that is, the center terminal of one cell is connected to the side terminal on the other cell, and of the two remaining terminals one is brought to binding post H on the bell and



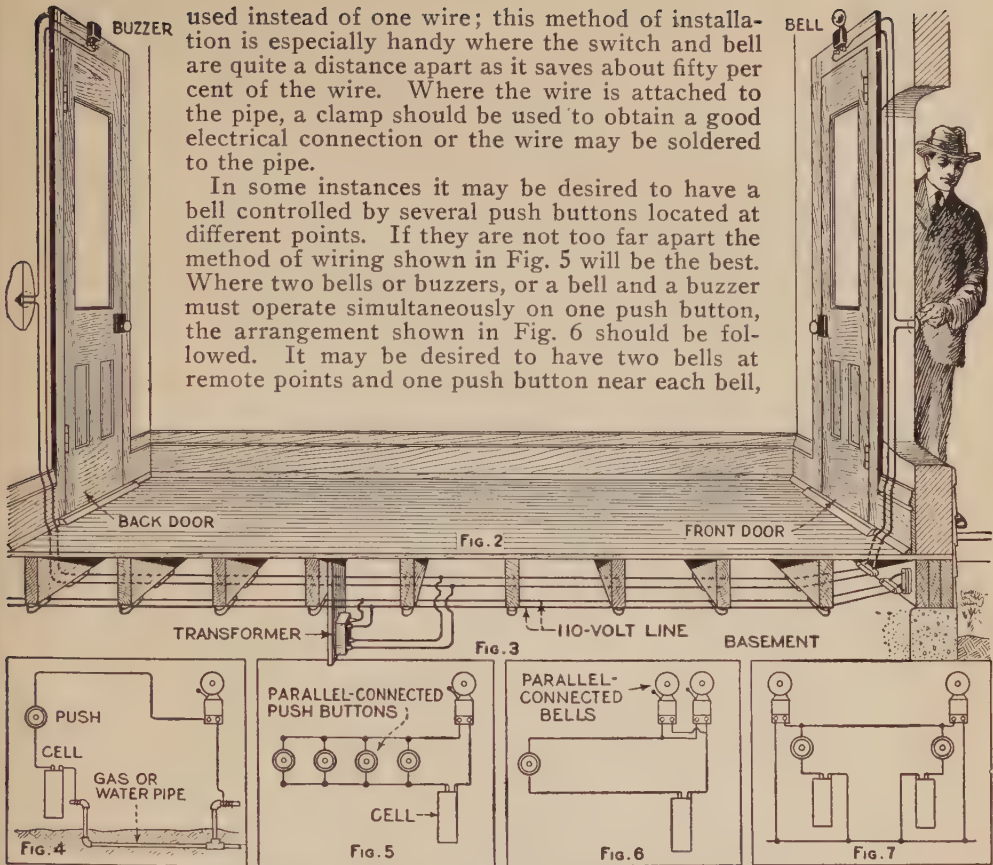
Household Doorbells and Buzzers Can Easily Be Repaired by Any Amateur. Fig. 1 Shows the Actual Connections of a Simple Doorbell Circuit and the Mechanism of the Bell

the other to one of the push-button terminals, while the other terminal on the push button is connected to the binding post A. By pressing the push button the electric circuit is closed and the bell rings. The current passes from the cells through the push-button switch to A, and through B, D, E, F, G and H back to the battery. These parts are respectively: B, the electromagnet; D, the armature; E, spring on armature making contact with point of screw G (which is held in bracket F). What happens when the current flows is that the cores in the electromagnet attract for a moment the armature and the hammer on the latter strikes the bell, but at practically the same instant contact is broken at E and F and the current flow stops, releasing the armature; however, only momentarily, for, so long as the button on the switch is pressed, current pushes on from the battery through A to the electromagnet, and the same thing happens over again so rapidly that the hammer strikes the bell with scarcely perceptible intervals. Therefore, when no bell is used, the apparatus is called a buzzer from the sound it produces. A light spring under the armature on pivot C aids this rapid back-and-forth movement. The amateur repairman can make all this much clearer to himself by providing himself with a secondhand doorbell and connecting it up as shown. Also take apart and dissect the push-button switch.

Although the experienced electrician may be able to locate certain troubles immediately, the amateur, to save time and to learn faster, had better work systematically, beginning, when the bell system does not work right, with the batteries. These may be dead or exhausted, and this is the commonest "trouble" encountered. It is easy to test the cells with a lamp from a small flashlight, but the cells show decided symptoms of exhaustion several weeks before they actually go dead, the action of the bell becoming weaker and weaker every day. One can then deal with the exposed parts that can be examined without disassembling, that is, the wires and their connections at the cells and the bell base. If the binding posts do not hold the wires firmly, tighten the screws, and if there is any corrosion found around the connections, clean them carefully to make good electric contacts. Next examine the insulation, which may have been chafed off at some corner; wrap any such points with friction tape, so that the wires cannot come into contact. If broken wires are met with, cut out the broken piece and splice in a new one, soldering and taping

the joints. Often these simple steps will suffice to restore an installation that will not ring at all or that rings intermittently or weakly. If they do not, unscrew the push button and see that the terminals hold the wires firmly, that the screws holding the contact springs are tight; that the springs come together and fly apart when the button is pushed and released, and that all contacts are free from corrosion. Remedy any defects by tightening screws, bending or replacing the springs and cleaning the contacts. Weak or loose contact springs may cause a bell to ring suddenly even though no one touches the button. Often it will be necessary to provide a new push switch to remedy troubles here. As a rule the mechanical parts of the bell ringer give little trouble. The bell hammer may have been bent some way so that it does not hit the bell, or bears so tightly against the bell that the armature cannot vibrate, but these troubles are easily remedied by loosening the screw and bending the hammer shank. Another reason why the bell will not ring may be found at the point where the spring E makes contact with the end of the screw G. The repeated and rapid making and breaking of contact here causes tiny electric sparks to fly back and forth between the screw and the spring, so that the tip of the screw is burnt off. Remedy this by scraping off any burnt part and readjusting the screw until the armature again vibrates freely.

In cities and towns where lighting current is supplied, a small bell-ringing transformer may be used instead of dry cells. The method of installing such a transformer is shown in Fig. 3. Two of its terminals are connected to the 110-volt line and the other two terminals to the bell circuit. The proper connections are all indicated on the transformer, so that no mistake can be made if the wiring is done carefully. The two terminals to which the bell circuit connects usually supply 6 volts' pressure. On some types of transformers there are three terminals on the bell-circuit side so that any voltage of 6, 8 or 14 volts can be obtained. The two outer terminals give 14 volts, the center and one end terminal give 6 volts, and the center and the other end terminal 8 volts. These voltages are marked between the terminals. Fig. 3 shows how a doorbell and a buzzer on the front and back door of the house are wired, each being controlled with a push-button switch, and run by city current through a transformer. When a gas or water pipe runs close to the bell and also close to the push button, it can be



Figs. 2 and 3, an Actual Installation of a Bell and Buzzer Supplied with Current through a Small Transformer; Below, Connections for Various Bell Installations in Home and Office

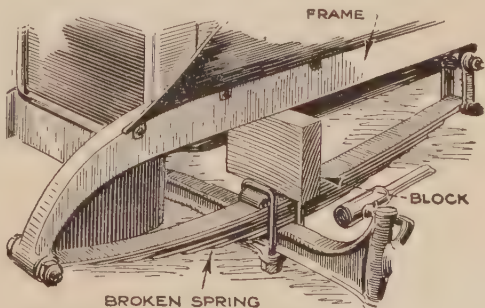
operating both bells at the same time. This arrangement, shown in Fig. 7, is handy between the house and barn on the farm, for example. The lower conductor, to which four taps are made, may be a

water pipe if one runs along the points indicated. In these diagrams a single dry cell is indicated to denote the source of current, but at least two dry cells should be used, or a transformer.

An Emergency Spring Repair

While driving over a rough mountain detour, I broke one of the front springs on my automobile. As I was about twenty miles from the nearest service shop, with five miles of rough road ahead, and as the break was a bad one, all but the bottom leaf being broken, an emergency repair of some kind was necessary. I jacked up the frame of the car and then inserted a piece of planking (which I found near by) between the frame and the broken spring, parallel to the front axle and directly above it as indicated. Of course, I wired the piece in place so that it could not work loose. With this repair I drove on to the repair shop without any trouble or diffi-

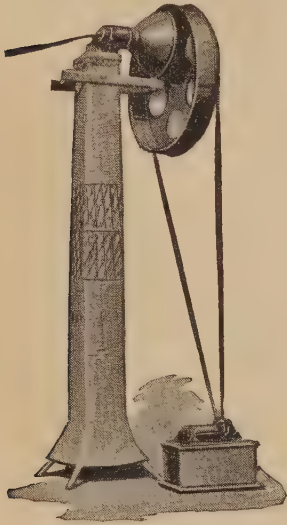
culty, although the bumps and jolts, taken by the frame directly, were unpleasant.—Hal. S. Borland, Asheville, N. C.



Block Inserted under Frame Is Good Emergency Repair for Broken Spring

Old Phonograph Used to Turn Color Wheel

In a small western dance hall where it was desired to use a color wheel but a small electric motor was considered too expensive, an old phonograph of the cylindrical-record type was found useful. It was placed on the floor, as shown in the photo, and a length of rope serving as a belt was run from the phonograph cylinder to the color wheel. To give a presentable appearance the spotlight and color wheel were mounted on an old wicker lampstand.—Charles W. Geiger, San Francisco, Calif.



How to Read the Future

Whether or not the householder "believes in signs," he would do well to pay heed to the following maxims, which are the result of long experience and study on the part of Mr. John J. Gilday, chief of the fire department of Hoboken, N. J.:

A crack in your chimney is a sure sign that you are going to move.

To see a paperhanger hang paper over a flue hole indicates an impending loss.

It is worse luck to look in a dark closet with a lighted match than to see the new moon over your left shoulder.

When the wind moans it is extremely bad luck to burn trash near your house.

If you smell gas or gasoline and look for it with a lighted match, it is probable that you are about to start on a long journey.

If you have a pile of rubbish in your cellar, it indicates that a crowd of people are coming to your house.

A quart of gasoline will cause an automobile to move three miles. A similar amount in household cleaning may cause three auto fire trucks and an ambulance to run a similar distance.

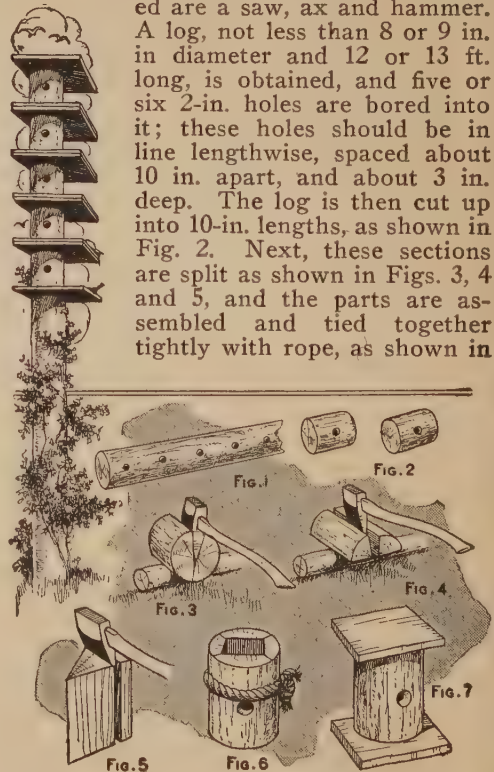
A child who plays with matches will gain experience—if he lives.

Wood for Cupboards, Cabinets and Refrigerators

One essential of woods used in making compartments for storing foods is the absence of strong odors. Cedars are not recommended for this purpose, although, if they must be used, they can be painted to kill the odor somewhat. Other woods, such as hemlock, pine, cypress and cottonwood, while they also have distinct odors, will not impair the quality of the food unless the latter is placed in direct contact with them. The wood used in building refrigerators is subject to extremely trying conditions. Light woods conform to the requirements better than the heavier and denser woods, but do not permit the beauty of finish possible with oak, ash or birch. Elm is a suitable wood and is, in fact, used largely in refrigerators because it stands the moisture well, and is not affected by repeated scrubbing.

Rustic Bird Houses

Novel rustic bird houses of odd design can be made from a saw log of straight-grained wood, preferably black oak or walnut. The only tools needed are a saw, ax and hammer. A log, not less than 8 or 9 in. in diameter and 12 or 13 ft. long, is obtained, and five or six 2-in. holes are bored into it; these holes should be in line lengthwise, spaced about 10 in. apart, and about 3 in. deep. The log is then cut up into 10-in. lengths, as shown in Fig. 2. Next, these sections are split as shown in Figs. 3, 4 and 5, and the parts are assembled and tied together tightly with rope, as shown in

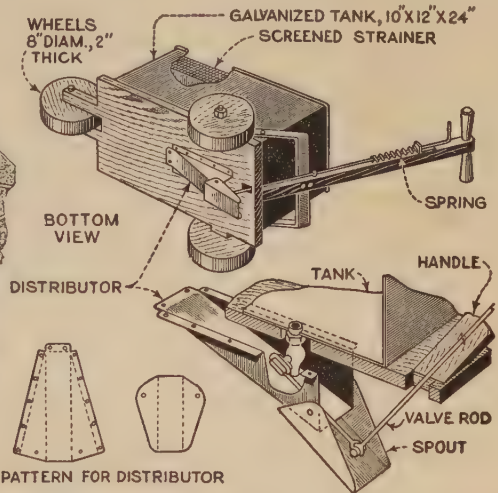
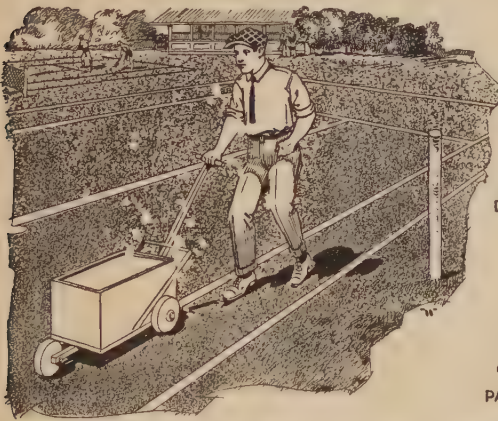


Novel Rustic Bird Houses Made from Log

Fig. 6. A number of 10 by 10-in. pieces of 1-in. board are nailed to the ends of these units, each thus forming an individual house, Fig. 7, and the rope is removed. The remaining part of the log can be set in the ground and the houses mounted on it, one above the other, as shown to the left. Bluebirds, woodpeckers, house martins and wrens are especially fond of these houses. If desired, a few crosspieces can be nailed to the log to form a trellis for a vine, which adds to the natural beauty of the arrangement.—Willis Mehanna, Bussey, Iowa.

Tennis-Court Marker

Tennis-court lines laid with dry lime are neither lasting nor otherwise quite satisfactory. For this reason I made the



Constructional Details and Method of Using a Three-Wheeled Tennis-Court Liner Which Makes Durable Marks and Can Readily Be Made and Operated by Anyone

wet liner shown in the drawing, a simple machine that will make a durable smooth-edged line when thoroughly dry. The tank is made of galvanized sheet iron; it is about 24 in. long, 10 in. wide and 12 in. high, and is supported on a low three-wheeled wooden truck. The wheels are about 8 in. in diameter and 2 in. thick. A handle is fitted on the truck and is supported by a flat-metal bracket. In the top of the tank is a strainer and lid which hooks on the edge of the tank. A gas cock is soldered in the bottom, flush on the inside, and a two-piece sheet-metal trough or distributor is nailed to the bottom of the truck directly under the cock. The lower details show how the distributor is cut and bent. The cock is opened and closed by means of two metal rods pivoted end to end, the shorter one being bent around the handle of the cock. The longer rod is bent to form a finger grip

at the upper end and is held alongside the handle of the truck by means of a screweye and a small bracket. A coil spring is held on the rod between the bracket and a cotter key and washer, so that when the rod is released the gas cock will be turned shut. In use, a thin solution of slaked lime and water is mixed thoroughly and poured through the strainer into the tank. The right proportion of lime and water can best be determined by experiment; it has been found that a thin mixture is better than a thick one, as it soaks into the ground more easily. Before marking, the earth must be smoothed and rolled, then sprinkled.

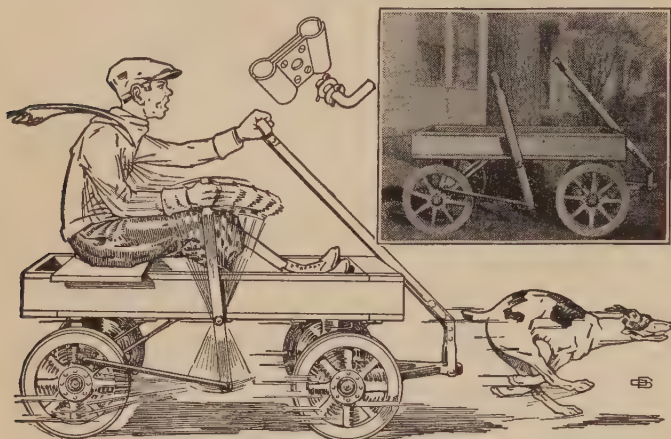
Never try to mark dry earth, as the solution will roll instead of adhering to the earth. After a few trials anyone will be able to make a smooth line.—Leroy Cox, Placentia, Calif.

Preventing Solid-Tire Wheels from Slipping

The cook at the navy-yard hospital at Charleston, S. C., has perforated solid tires on his truck. One day he got stuck in the mud and had a hard job getting out, so I sawed up a couple of old broomsticks into 8-in. lengths. These are stuck through the holes in the tires when the roads are muddy, or muddy spots are likely to be encountered, and he hasn't had any trouble since, as these sticks are very effective in preventing the wheels from slipping in the mud.—Harry W. Yeager, Charleston, S. C.

Driving Coaster by Hand

A simple attachment on a coaster, as shown in the drawing and photo, can easily be made by any boy from material



Simple Attachment on Coaster Wagon Permits Driving It by Hand at Considerable Speed

that can readily be obtained anywhere. A heavy flat-iron clamp made in two parts to fit over adjacent spokes on the right rear wheel is screwed together and a hole is drilled through it to receive the end of a connecting rod, which is made of $\frac{1}{2}$ -in. round iron and bent at the end to run free of the wheel hub. A washer and pin are provided on each side of the clamp to hold the connecting rod in place, and a wooden handle, such as a length of broomstick, is pivoted to the side of the cart and to the other end of the connecting rod, as shown. The upper part of the handle should be of sufficient length to permit the driver to slide his hand up or down until he finds a point where the propelling action is smoothest.—Loy E. Owen, College View, Nebr.

Substitute for Phonograph Diaphragm

The diaphragm of my phonograph reproducer was broken accidentally at a time when I expected to entertain visitors. In the emergency, I obtained an old photographic cut film and made a substitute which proved entirely successful. I traced around the broken diaphragm, cut out one of similar size from the film and drilled a hole in the center. The disk, thus made, was placed on the reproducer and the stylus bar connected to the diaphragm with a small screw.—Henry B. O'Connell, New Haven, Conn.

How to Apply Adhesives

In general, the surfaces to which adhesives are to be applied should be dry and free from grease or other impurities.

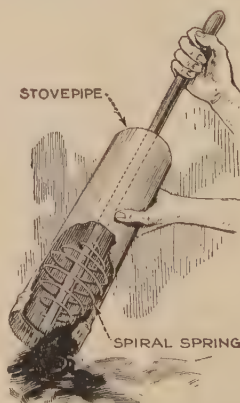
If the material is very porous, it may be necessary first to fill the pores by applying one or more preliminary coats of the adhesive, allowing each coat to sink in. The final coat must be put on very thinly and the surfaces to be joined pressed into the very closest possible contact. This applies especially to wood, china, etc., and joints made in this manner will be stronger than if a thick layer of the adhesive were applied.

Many adhesives can be kept for a long time without impairment of their strength, if they do not

decay or become moldy; others should be used as soon as possible after they are prepared. Some, which must be warmed before applying, often dry out or become stiff and should be mixed with water to give them the proper consistency.

Cleaning Stovepipes

Pounding stovepipes to remove the soot accumulated in them during the winter is ineffective and injurious. A better way is to use the easily made cleaner shown in the illustration. It consists of a



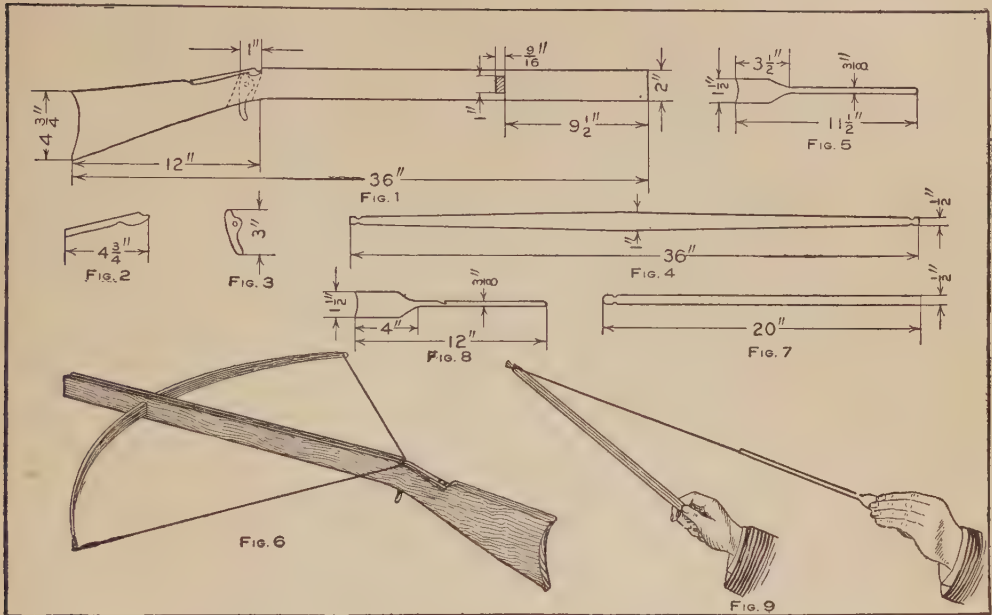
length of spring wire formed to a double cone-shaped spiral, about 6 in. in diameter at its widest point, and attached to a discarded broomstick as indicated. By inserting the cleaner into the end of the pipe and moving it back and forth, the inside of the pipe is scraped clean in a few

seconds. It is the soot particles sticking to the inner surface that absorb moisture and cause rusting during the summer, and pounding will not loosen them.

How to Make a Crossbow and Arrow Sling

In the making of this crossbow it is best to use maple for the stock, but if this wood cannot be procured, good straight-grained pine will do. The

opposite end, which should be slanting a little as shown by the dotted lines. A spring, Fig. 2, is made from a good piece of oak and fastened to the stock



Details of the Bow-Gun and Arrow Sling

material must be $1\frac{1}{2}$ in. thick, 6 in. wide and a trifle over 3 ft. long. The bow is made from straight-grained oak, ash, or hickory, $\frac{5}{8}$ in. thick, 1 in. wide and 3 ft. long. A piece of oak, $\frac{3}{8}$ in. thick, $1\frac{1}{2}$ in. wide and 6 ft. long, will be sufficient to make the trigger, spring and arrows. A piece of tin, some nails and a good cord will complete the materials necessary to make the crossbow.

The piece of maple or pine selected for the stock must be planed and sand-papered on both sides, and then marked and cut as shown in Fig. 1. A groove is cut for the arrows in the top straight edge $\frac{3}{8}$ in. wide and $\frac{3}{8}$ in. deep. The tin is bent and fastened on the wood at the back end of the groove where the cord slips out of the notch; this is to keep the edges from splitting.

A mortise is cut for the bow at a point $9\frac{1}{2}$ in. from the end of the stock, and one for the trigger 12 in. from the

with two screws. The trigger, Fig. 3, which is $\frac{1}{4}$ in. thick, is inserted in the mortise in the position when pulled back, and adjusted so as to raise the spring to the proper height, and then a pin is put through both stock and trigger, having the latter swing quite freely. When the trigger is pulled, it lifts the spring up, which in turn lifts the cord off the tin notch.

The stick for the bow, Fig. 4, is dressed down from a point $\frac{3}{4}$ in. on each side of the center line to $\frac{1}{2}$ in. wide at each end. Notches are cut in the ends for the cord. The bow is not fastened in the stock, it is wrapped with a piece of canvas $1\frac{1}{2}$ in. wide on the center line to make a tight fit in the mortise. A stout cord is now tied in the notches cut in the ends of the bow making the cord taut when the wood is straight.

The design of the arrows is shown in Fig. 5 and they are made with the

blades much thinner than the round part.

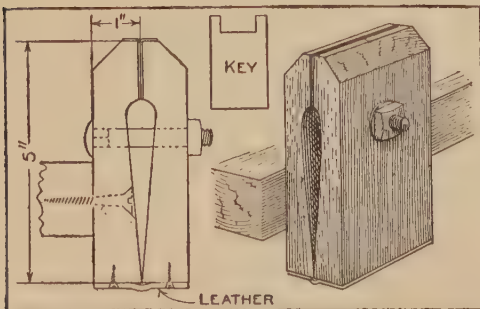
To shoot the crossbow, pull the cord back and down in the notch as shown in Fig. 6, place the arrow in the groove, sight and pull the trigger as in shooting an ordinary gun.

The arrow sling is made from a branch of ash about $\frac{1}{2}$ in. in diameter, the bark removed and a notch cut in one end, as shown in Fig. 7. A stout cord about $2\frac{1}{2}$ ft. long is tied in the notch and a large knot made in the other or loose end. The arrows are practically the same as those used on the crossbow, with the exception of a small notch which is cut in them as shown in Fig. 8.

To throw the arrow, insert the cord near the knot in the notch of the arrow, then grasping the stick with the right hand and holding the wing of the arrow with the left, as shown in Fig. 9, throw the arrow with a quick slinging motion. The arrow may be thrown several hundred feet after a little practice.—Contributed by O. E. Trownes, Wilmette, Ill.

A Home-Made Vise

Cut two pieces of wood in the shape shown in the sketch and bore a $\frac{3}{8}$ -in. hole through both of them for a common carriage bolt. Fasten one of the pieces to the edge of the bench with a large wood screw and attach the other piece to the first one with a piece of leather nailed across the bottom of both pieces. The nut on the carriage bolt may be tightened with a wrench,

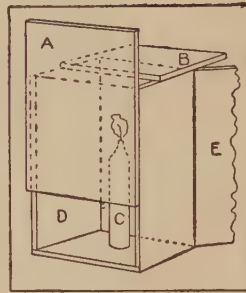


Details of a Home-Made Bench Vise

or, better still, a key filed out of a piece of soft steel to fit the nut. The edges of the jaws are faced with sheet metal which can be copper or steel suitable for the work it is intended to hold.

Temporary Dark Room Lantern

Occasionally through some accident to the regular ruby lamp, or through the necessity of developing while out of reach of a properly equipped dark room, some makeshift of illumination must be improvised. Such a temporary safe light may be made from an empty cigar box in a short time.



Remove the bottom of the box, and nail it in position as shown at A. Remove one end, and replace as shown at B. Drive a short

wire nail through the center of the opposite end to serve as a seat for the candle, C. The lamp is finished by tacking two or more layers of yellow post-office paper over the aperture D, bringing the paper well around to the sides and bottom of the box to prevent light leakage from the cracks around the edges, says Photo Era. The hinged cover E, is used as a door, making lighting and trimming convenient. The door may be fastened with a nail or piece of wire. It is well to reinforce the hinge by gluing on a strip of cloth if the lamp is to be in use more than once or twice. This lamp is safe, for the projecting edges of A and B form light-shields for the ventilation orifice and the crack at the top of the hinged cover, respectively. Moreover, since the flame of the candle is above A, only reflected and transmitted light reaches the plate, while the danger of igniting the paper is reduced to a minimum.

The paint will sag and run if too much oil is put in white lead.

Camps and How to Build Them

There are several ways of building a temporary camp from material that is always to be found in the woods, and whether these improvised shelters are intended to last until a permanent camp is built, or only as a camp on a short excursion, a great deal of fun can be had in their construction. The Indian camp is the easiest to make. An evergreen tree with branches growing well down toward the ground furnishes all the material. By chopping the trunk almost through, so that when the tree falls the upper part will still remain attached to the stump, a serviceable shelter can be quickly provided. The cut should be about 5 ft. from the ground. Then the boughs and branches on the under side of the fallen top are chopped away and piled on top. There is room for several persons under this sort of shelter, which offers fairly good protection against any but the most drenching rains.

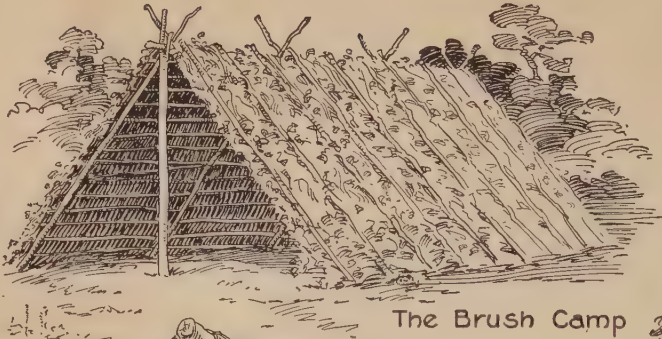
The Indian wigwam sheds rain better, and where there are no suitable trees that can be cut, it is the easiest camp to make. Three long poles with the tops tied together and the lower ends spaced 8 or 10 ft. apart, make the frame of the wigwam. Branches and brush can easily be piled up, and woven in and out on these poles so as to shed a very heavy rain.

The brush camp is shaped like an ordinary "A" tent. The ridge pole should be about 8 ft. long and supported by crotched uprights about 6 ft. from the ground. Often the ridge pole can be laid from one small tree to another. Avoid tall trees on account of lightning. Eight or ten long poles are then laid slanting against the ridge pole on each side. Cedar or hemlock boughs make the best thatch for the brush camp. They should be piled up to a thickness of a foot or more over the slanting poles and woven in and out to keep them from slipping. Then a number of poles should be laid over them to prevent them from blowing away.

In woods where there is plenty of

bark available in large slabs, the bark lean-to is a quickly constructed and serviceable camp. The ridge pole is set up like that of the brush camp. Three or four other poles are laid slanting to the ground on one side only. The ends of these poles should be pushed into the earth and fastened with crotched sticks. Long poles are then laid crossways of these slanting poles, and the whole can be covered with brush as in the case of the brush camp or with strips of bark laid overlapping each other like shingles. Where bark is used, nails are necessary to hold it in place. Bark may also be used for a wigwam and it can be held in place by a cord wrapped tightly around the whole structure, running spiralwise from the ground to the peak. In the early summer, the bark can easily be removed from most trees by making two circular cuts around the trunk and joining them with another vertical cut. The bark is easily pried off with an ax, and if laid on the ground under heavy stones, will dry flat. Sheets of bark, 6 ft. long and 2 or 3 ft. wide, are a convenient size for camp construction.

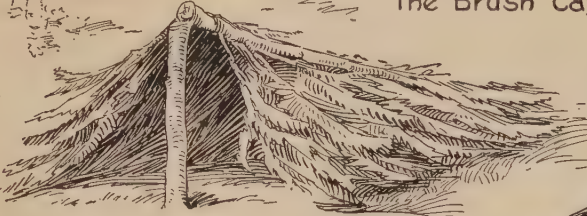
The small boughs and twigs of hemlock, spruce, and cedar, piled 2 or 3 ft. deep and covered with blankets, make the best kind of a camp bed. For a permanent camp, a bunk can be made by laying small poles close together across two larger poles on a rude framework easily constructed. Evergreen twigs or dried leaves are piled on this, and a blanket or a piece of canvas stretched across and fastened down to the poles at the sides. A bed like this is soft and springy and will last through an ordinary camping season without renewal. A portable cot that does not take up much room in the camp outfit is made of a piece of heavy canvas 40 in. wide and 6 ft. long. Four-inch hems are sewed in each side of the canvas, and when the camp is pitched, a 2-in. pole is run through each hem and the ends of the pole supported on crotched sticks.



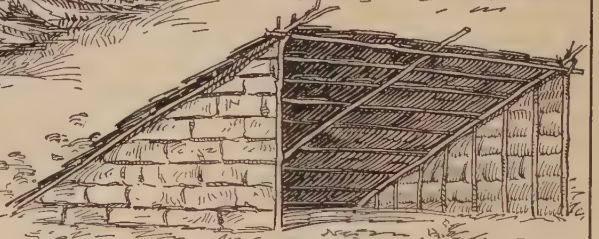
The Brush Camp



The Wigwam



The Indian Camp



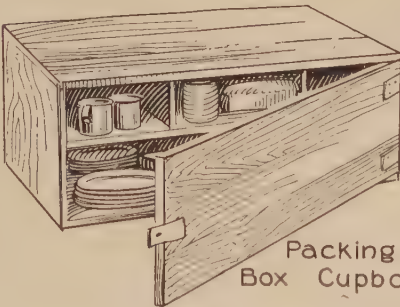
A Closed Lean-to, Thatched with Bark



Tongs



Broom of Hemlock Twigs



Packing Box Cupboard

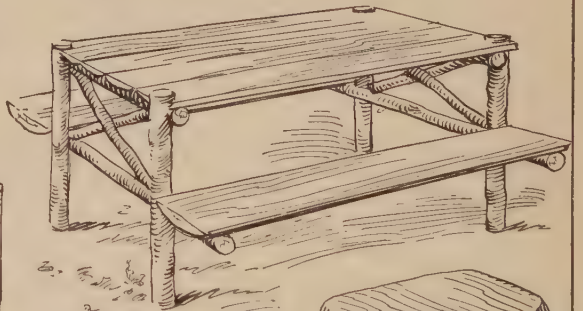
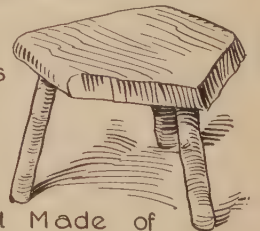


Table and Chairs Combined



Stool Made of a Block



Bunk with Mattress of Springy Boughs

Fresh water close at hand and shade for the middle of the day are two points that should always be looked for in selecting a site for a camp. If the camp is to be occupied for any length of time, useful implements for many purposes can be made out of such material as the woods afford. The simplest way to build a crane for hanging kettles over the campfire is to drive two posts into the ground, each of them a foot or more from one end of the fire space, and split the tops with an ax, so that a pole laid from one to the other across the fire will be securely held in the split. Tongs are very useful in camp. A piece of elm or hickory, 3 ft. long and $1\frac{1}{2}$ in. thick, makes a good pair of tongs. For a foot in the middle of the stick, cut half of the thickness away and hold this part over the fire until it can be bent easily to bring the two ends together, then fasten a crosspiece to hold the ends close together, shape the ends so that anything that drops into the fire can be seized by them, and a serviceable pair of tongs is the result. Any sort of a stick that is easily handled will serve as a poker. Hemlock twigs tied around one end of a stick make an excellent broom. Movable seats for a permanent camp are easily made by splitting a log, boring holes in the rounded side of the slab and driving pegs into them to serve as legs. A short slab or plank can easily be made into a three-legged stool in the same way.

Camper usually have boxes in which their provisions have been carried. Such a packing box is easily made into a cupboard, and it is not difficult to improvise shelves, hinges, or even a rough lock for the camp larder.

A good way to make a camp table is to set four posts into the ground and nail crosspieces to support slabs cut from chopped wood logs to form a top. Pieces can be nailed onto the legs of the table to hold other slabs to serve as seats, and affording accommodation for several persons.

Brooder for Small Chicks

A very simple brooder can be constructed by cutting a sugar barrel in half and using one part in the manner



Brooder for Young Chicks Kept Warm with a Jug of Boiling Water

described. Line the inside of the half barrel with paper and then cover this with old flannel cloth. Make a cover for the top and line it in the same manner. At the bottom cut a hole in the edge, about 4 in. deep and 4 in. wide, and provide a cover or door. The inside is kept warm by filling a jug with boiling water and setting it within, changing the water both morning and night. When the temperature outside is 10 deg. the interior can be kept at 90 or 100 deg., but the jug must be refilled with boiling water at least twice a day.

Faucet Used as an Emergency Plug

A brass faucet split as shown at A during a cold spell, and as no suitable plug to screw into the elbow after removing the faucet was at hand, I drove a small cork, B, into the end of the faucet and screwed it back in place. The cork converted the faucet into an

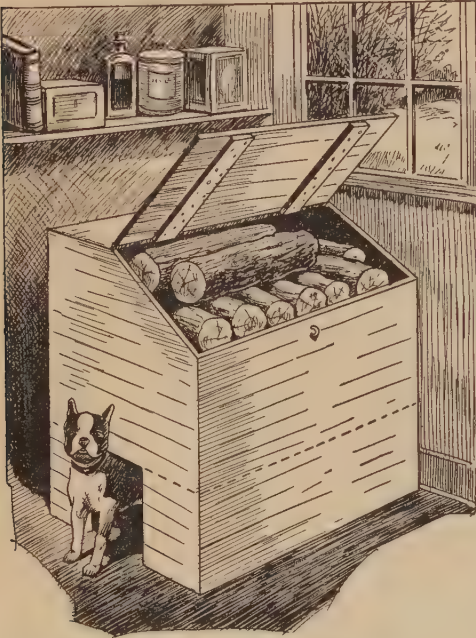


A Tight-Fitting Cork Driven into a Cracked Faucet Converted It into an Emergency Plug

emergency plug which prevented leakage until the proper fitting to take its place could be secured.—Contributed by James M. Kane, Doylestown, Pa.

Combined Kennel and Wood Box

In most farm houses a wood box is kept on the kitchen porch. Its advantages may be increased by making the lower part



Combined Dog Kennel and Wood Box in Farm House Saves Space

serve as a dog kennel. The bottom is raised about 18 in. and a door cut in the side, as shown in the drawing. This arrangement is neat and also effects a saving of space, which is usually rather limited in the working quarters of a farm house.—E. A. Goering, Langenburg, Sask.

Keeping the Old Clock Running

Though an old clock may stop for no apparent reason, you may be sure that there is good cause. Its works may be in need of a thorough cleaning. The pallets on the anchor of the escapement may not be meeting the teeth of the pinion properly; or, the bearings of the pinions in general throughout the clock may be so worn that the teeth of the gears no longer mesh as they should. Cleaning the works of a clock with gasoline and reoiling the bearings is a simple operation that anyone can do. Adjusting the anchor of the escapement so that the pallets will meet the teeth of the pinion properly is likewise a simple operation. But, taking up the bearings is not quite so easy. Still, if one goes about the job in the right way, it is a simple matter and many years of

service can be added to the life of the old clock. The works should be removed from the case so that one can get at both sides of the frame, and then, working with a thin punch that has a rather sharp point, a series of punch marks are made in a circle about each of the loose bearings. The punch should be tapped lightly in making these marks so that the hole will not be closed up too tightly the first time around, for it is better to work the metal in gradually toward the center, so that when all the excess play is taken up, the pinion will bear evenly all around and run true. Slight wear on the faces of the pallets sometimes causes trouble. If the slightest wear is apparent rub these surfaces down on a fine oilstone.

Attaching Screen-Door Spring

With the customary coil-spring arrangement on screen doors, trouble is often experienced because the door is often thrown wide open, and the spring eventually becomes stretched so that it will no longer keep the door tightly shut. This trouble can readily be overcome by arranging the

spring in the manner shown, a length of strong cord being tied to one end of the spring, slipped through a pulley fastened above the door, on the inside, and run to the door as indicated. No matter how far the screen door is swung open, the spring will close it. Of course, the spring will not last "for ever," but it will last much longer if mounted in this way.—C. L. Epton, Spartanburg, S. C.



☛To hold back shadows when printing from a negative, dip a piece of putty into dry Indian red or yellow ochre and apply to the clear glass of the printing frame over the shadow that is to be held back. The color can be applied as lightly and evenly as desired.

How to Make a Small Electric Motor

The field frame of the motor, Fig. 1, is composed of wrought sheet iron, which may be of any thickness so that, when several pieces are placed together, they will make a frame $\frac{3}{4}$ in. thick. It is necessary to lay out a template of the frame as shown, making it $\frac{1}{16}$ in. larger than the dimensions given, to allow for filing to shape after the parts are fastened together. After the template is marked out, drill the four rivet holes, clamp the template, or pattern, to the sheet iron and mark carefully with a scribe. The bore can be marked with a pair of dividers, set at $\frac{1}{8}$ in. This will mark a line for the center of the holes to be drilled with a $\frac{1}{4}$ -in. drill for removing the unnecessary metal. The points formed by drilling the holes can be filed to the pattern size. Be sure to mark and cut out a sufficient number of plates to make a frame $\frac{3}{4}$ in. thick, or even $\frac{1}{8}$ in. thicker, to allow for finishing.

After the plates are cut out and the rivet holes drilled, assemble and rivet them solidly, then bore it out to a diameter of $2\frac{3}{4}$ in. on a lathe. If the thickness is sufficient, a slight finishing cut can be taken on the face. Before removing the field from the lathe, mark off a space, $3\frac{3}{8}$ in. in diameter, for the field core with a sharp-pointed tool, and for the outside of the frame, $4\frac{1}{2}$ in. in diameter, by turning the lathe with the hand. Then the field can be finished to these marks, which will make it uniform in size. When the frame is finished so far, two holes, $3\frac{5}{8}$ in. between centers, are drilled and tapped with a $\frac{3}{8}$ -in. tap. These holes are for the bearing studs. Two holes are also drilled and tapped for $\frac{1}{4}$ -in. screws, which fasten the holding-down lugs or feet to the frame. These lugs are made of a piece of $\frac{1}{8}$ -in. brass or iron, bent at right angles as shown.

The bearing studs are now made, as shown in Fig. 2, and turned into the threaded holes in the frame. The bearing supports are made of two pieces of

$\frac{1}{8}$ -in. brass, as shown in the left-hand sketch, Fig. 3, which are fitted on the studs in the frame. A $\frac{5}{8}$ -in. hole is

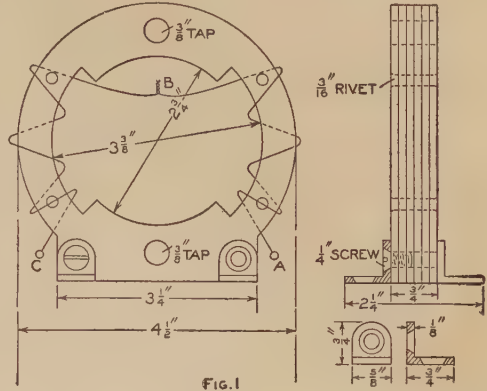


FIG. 1

The Field-Coil Core is Built Up of Laminated Wrought Iron Riveted Together

drilled in the center of each of these supports, into which a piece of $\frac{5}{8}$ -in. brass rod is inserted, soldered into place, and drilled to receive the armature shaft. These bearings should be fitted and soldered in place after the armature is constructed. The manner of doing this is to wrap a piece of paper on the outside of the finished armature ring and place it through the opening in the field, then slip the bearings on the ends of the shaft. If the holes in the bearing support should be out of line, file them out to make the proper adjustment. When the bearings are located, solder them to the supports, and build up the solder well. Remove



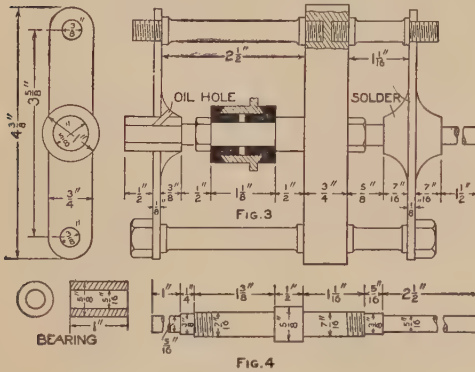
FIG. 2

The Bearing Studs are Turned from Machine Steel Two of Each Length being Required

the paper from the armature ring and see that the armature revolves freely in the bearings without touching the inside of the field at any point. The supports are then removed and the solder turned up in a lathe, or otherwise finished. The shaft of the arma-

ture, Fig. 4, is turned up from machine steel, leaving the finish of the bearings until the armature is completed and fastened to the shaft.

The armature core is made up as fol-



The Assembled Bearing Frame on the Field Core and the Armature Shaft Made of Machine Steel

lows: Two pieces of wrought sheet iron, $\frac{1}{8}$ in. thick, are cut out a little larger than called for by the dimensions given in Fig. 5, to allow for finishing to size. These are used for the outside plates and enough pieces of No. 24 gauge sheet iron to fill up the part between until the whole is over $\frac{3}{4}$ in. thick are cut like the pattern. After the pieces are cut out, clamp them together and drill six $\frac{1}{8}$ -in. holes through them for rivets. Rivet them together, and anneal the whole piece by placing it in a fire and heating the metal to a cherry red, then allowing it to cool in the ashes. When annealed, bore out the inside to $1\frac{1}{16}$ in. in diameter and fit in a brass spider, which is made as follows: Procure a piece of brass, $\frac{3}{4}$ in. thick, and turn it up to the size shown and file out the metal between the arms. Slip the spider on the armature shaft and secure it solidly with the setscrew so that the shaft will not turn in the spider when truing up the armature core. File grooves or slots in the armature ring so that it will fit on the arms of the spider. Be sure to have the inside of the armature core run true. When this is accomplished, solder the arms of the spider to the metal of the armature core. The shaft with the core is then put in a

lathe and the outside turned off to the proper size. The sides are also faced off and finished. Make the core $\frac{3}{4}$ in. thick. Remove the core from the lathe and file out slots $\frac{1}{4}$ in. deep and $\frac{7}{16}$ in. wide.

The commutator is turned from a piece of brass pipe, $\frac{3}{4}$ in. inside diameter, as shown in Fig. 6. The piece is placed on a mandrel and turned to $\frac{3}{4}$ in. in length and both ends chamfered to an angle of 60 deg. Divide the surface into 12 equal parts, or segments. Find the centers of each segment at one end, then drill a $\frac{1}{8}$ -in. hole and tap it for a pin. The pins are made of brass, threaded, turned into place and the ends turned in a lathe to an outside diameter of $1\frac{1}{4}$ in. Make a slit with a small saw blade in the end of each pin for the ends of the wires coming from the commutator coils. Saw the ring into the 12 parts on the lines between the pins.

The two insulating ends for holding these segments are made of fiber turned to fit the bore of the brass tubing, as shown in Fig. 7. Procure 12 strips of mica, the same thickness as the width of the saw cut made between the segments, and use them as a filler and insulation between the commuta-

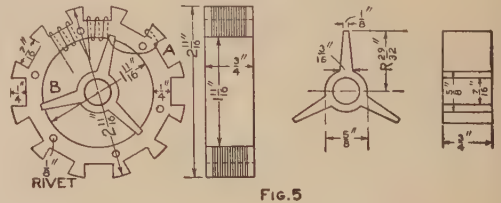


FIG. 5

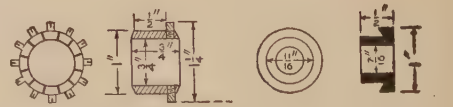


FIG. 6

FIG. 7

Armature-Ring Core, Its Hub and the Construction of the Commutator and Its Insulation

tor bars. Place them on the fiber hub and slip the hub on the shaft, then clamp the whole in place with the nut, as shown in Fig. 3. True up the commutator in a lathe to the size given in Fig. 6.

The brush holder is shaped from a

piece of fiber, as shown in Fig. 8. The studs for holding the brushes are cut from $\frac{5}{16}$ -in. brass rod, as shown in Fig. 9. The brushes consist of brass or copper wire gauze, rolled up and flattened out to $\frac{1}{8}$ in. thick and $\frac{1}{4}$ in. wide, one end being soldered to keep the wires in place. The holder is slipped on the projecting outside end of the bearing, as shown in Fig. 3, and held with a set-screw.

The field core is insulated before winding with $1/64$ -in. sheet fiber, washers, $1\frac{1}{8}$ in. by $1\frac{1}{2}$ in., being formed for the ends, with a hole cut in them to fit over the insulation placed on the cores. A slit is cut through from the hole to the outside, and then they are soaked in warm water, until they become flexible enough to be put in place. After they have dried, they are glued to the core insulation.

The field is wound with No. 18 gauge double-cotton-covered magnet wire, about 100 ft. being required. Drill a small hole through each of the lower-end insulating washers. In starting to wind, insert the end of the wire through the hole from the inside, at A, Fig. 1, and wind on four layers, which will take 50 ft. of the wire, and bring the end of the wire out at B. After one coil, or side, is wound start at C in the same manner as at A, using the same number of turns and the same length of wire. The two ends are joined at B.

The armature ring is insulated by covering the inside and brass spider with $\frac{1}{16}$ -in. sheet fiber. Two rings of $\frac{1}{16}$ -in. sheet fiber are cut and glued to the sides of the ring. When the glue is set, cut out the part within the slot ends and make 12 channel pieces from $1/64$ -in. sheet fiber, which are glued in the slots and to the fiber washers. Be sure to have the ring and spider covered so the wire will not touch the iron or brass.

Each slot of the armature is wound with about 12 ft. of No. 21 gauge double-cotton-covered magnet wire. The winding is started at A, Fig. 5, by bending the end around one of the projections, then wind the coil in one of

the slots as shown, making 40 turns, or four layers of 10 turns each, shellacking each layer as it is wound. After the coil is completed in one slot, allow about 2 in. of the end to protrude, to

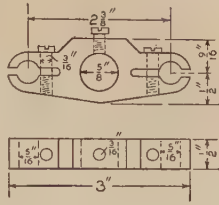


FIG. 8

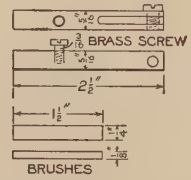


FIG. 9

The Insulated Brush Holder and Its Studs for Holding the Brushes on the Commutator

fasten to the commutator segment. Wind the next slot with the same number of turns in the same manner, and so on, until the 12 slots are filled. The protruding ends of the coils are connected to the pins in the commutator segments after the starting end of one coil is joined to the finishing end of the next adjacent. All connections should be securely soldered.

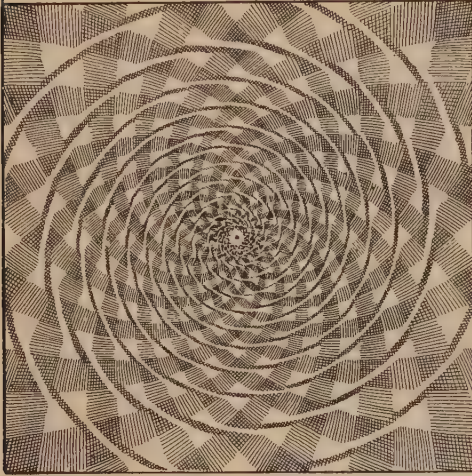
The whole motor is fastened with screws to a wood base, 8 in. long, 6 in. wide and 1 in. thick. Two terminals are fastened at one side on the base, and a switch at the other side.

To connect the wires, after the motor is on the stand, the two ends of the wire, shown at B, Fig. 1, are soldered together. Run one end of the field wire, shown at A, through a small hole in the base and make a groove on the under side so that the wire end can be connected to one of the terminals. The other end of the field wire C is connected to the brass screw in the brass brush stud. Connect a wire from the other brush stud, run it through a small hole in the base and cut a groove for it on the under side so that it can be connected through the switch and the other terminal. This winding is for a series motor. The source of current is connected to the terminals. The motor can be run on a 110-volt direct current, but a resistance must be placed in series with it.

☞ New tinware rubbed over with fresh lard and heated will never rust.

Another Optical Illusion

After taking a look at the accompanying illustration you will be positive that the cords shown run in a spiral toward the center, yet it shows a series of per-



The Cord Is Not a Spiral

fect circles of cords placed one inside the other. You can test this for yourself in a moment with a pair of compasses, or, still more simply, by laying a point of a pencil on any part of the cord and following it round. Instead of approaching or receding from the center in a continuous line, as in the case of a spiral, you will find the pencil returning to the point from which it started.

Substitute for Insulating Cleats

In wiring up door bells, alarms and telephones, as well as experimental work the use of common felt gun wads make a very good cleat for the wires. They are used in the manner illustrated in the accompanying sketch. The insulated wire is placed between two wads and fastened with two nails or screws. If one wad on the back is not thick enough to keep the wire away from the support, put on two wads behind and one in front of the wire and fasten in the same manner as described.



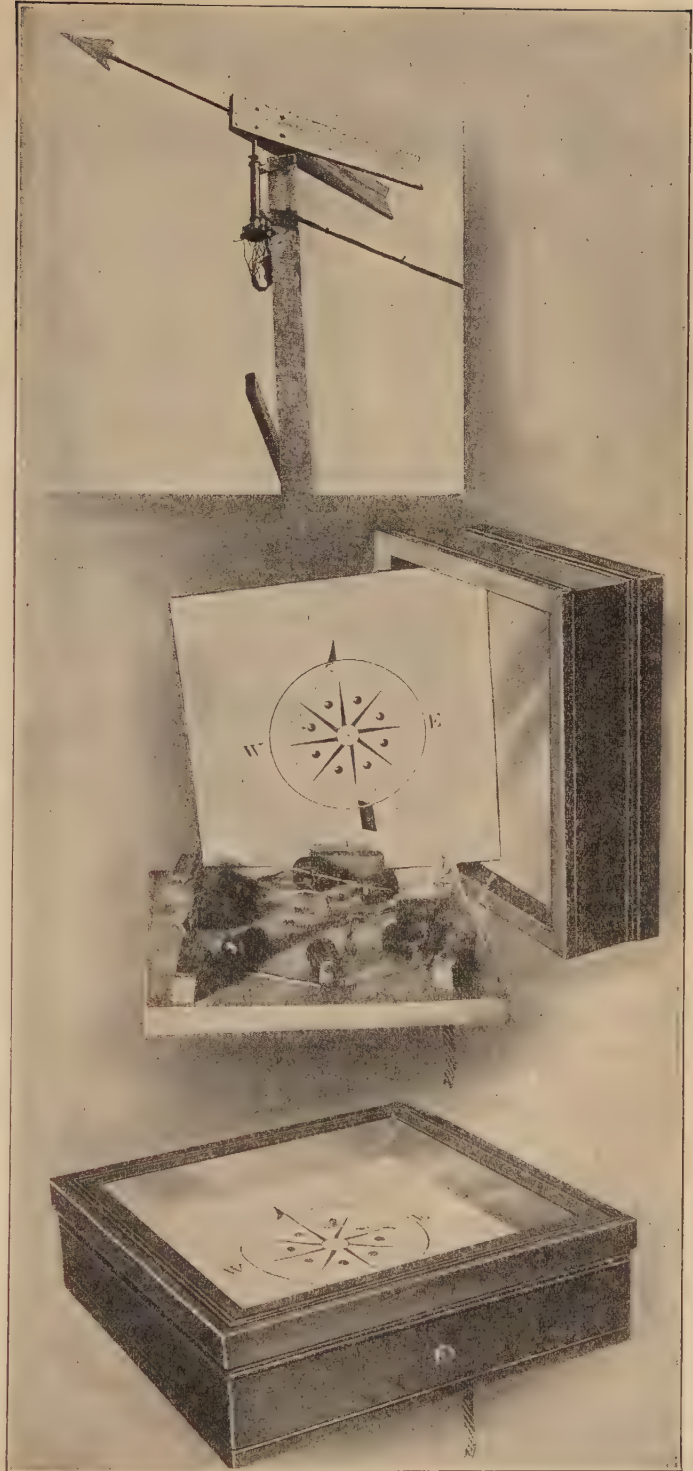
Electrically Operated Indicator for a Wind Vane

The accompanying photograph shows a wind vane connected with electric wires to an instrument at considerable distance which indicates by means of a magnetic needle the direction of the wind. The bearings of the vane consist of the head of a wornout bicycle. A $\frac{1}{2}$ -in. iron pipe extends from the vane and is held in place by the clamp originally used to secure the handle bar of the bicycle. In place of the forks is attached an eight-cylinder gas engine timer which is slightly altered in such a manner that the brush is at all times in contact, and when pointing between two contacts connects them both. Nine wires run from the timer, one from each of the eight contacts, and one, which serves as the ground wire, is fastened to the metallic body. The timer is set at such a position that when the vane points directly north, the brush of the timer makes a connection in the middle of a contact. When the timer is held in this position the brush will make connections with each of the contacts as the vane revolves.

The indicating device which is placed in a convenient place in the house consists of eight 4-ohm magnets fastened upon a 1-in. board. These magnets are placed in a 10-in. circle, 45 deg. apart and with their faces pointing toward the center. Covering these is a thin, wood board upon which is fastened a neatly drawn dial resembling a mariner's compass card. This is placed over the magnets in such a manner that there will be a magnet under each of the eight principal points marked on the dial. Over this dial is a magnetic needle or pointer, 6 in. long, perfectly balanced on the end of a standard and above all is placed a cover having a glass top. The eight wires from the timer contacts connect with the outside wires of the eight magnets separately and the inside wires from the magnets connect with the metal brace which holds the magnets in place. A wire is then connected from the metal

brace to a push button, two or three cells of dry battery and to the ground wire in connection with the timer. The wires are connected in such a manner that when the vane is pointing in a certain direction the battery will be connected in series with the coil under that part of the dial representing the direction in which the vane is pointing, thus magnetizing the core of the magnet which attracts the opposite pole of the needle toward the face of the magnet and indicating the way the wind is blowing. The pointer end of the needle is painted black.

If the vane points in such a direction that the timer brush connects two contacts, two magnets will be magnetized and the needle will point midway between the two lines represented on the dial, thus giving 16 different directions. Around the pointer end of the needle is wound a fine copper wire, one end of which extends down to about $\frac{1}{2}$ in. of the dial. This wire holds the needle in place when the pointer end is directly over the magnet attracting it; the magnet causing the needle to "dip" will bring the wire in contact with the paper dial. Without this attachment, the needle would swing a few seconds before coming to a standstill.



The Wind Vane, Magnets and Indicator

The vane itself is easily constructed as can be seen in the illustration. It should be about 6 ft. long to give the best results. The magnets used can be purchased from any electrical store in pairs which are called "instrument magnets." Any automobile garage can supply the timer and an old valueless bicycle frame is not hard to find. The cover is easily made from a picture frame with four small boards arranged to take the place of the picture as shown.

The outfit is valuable to a person who is situated where a vane could not be placed so as to be seen from a window and especially at night when it is hard to determine the direction of the wind. By simply pressing the push button on the side of the cover, the needle will instantly point to the part of the dial from which the wind is blowing.—Contributed by James L. Blackmer, Buffalo, N. Y.

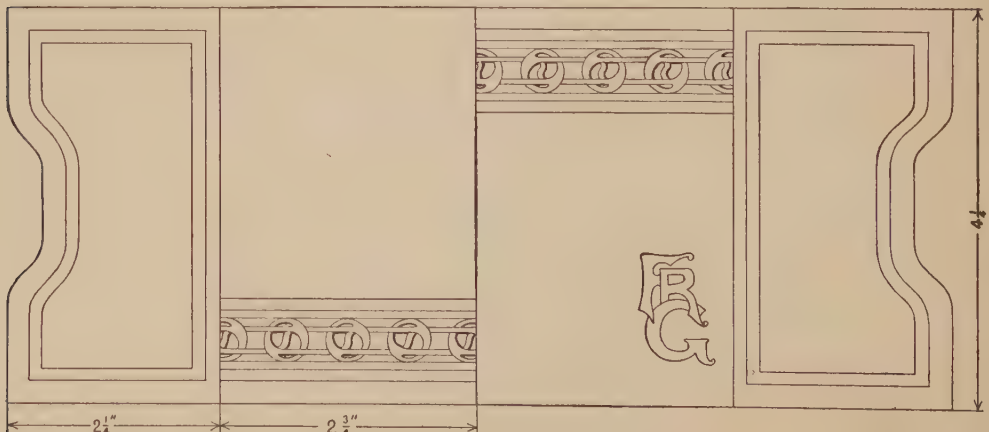
A Home-Made Floor Polisher

An inexpensive floor polisher can be made as follows: Secure a wooden box with a base 8 by 12 in. and about 6 in. high, also a piece of new carpet, 14 by 18 in. Cut 3-in. squares out of the four corners of the carpet and place the box squarely on it. Turn three of the flaps of the carpet up and tack them securely to the sides of the box. Before tacking the fourth side,

fold a couple of newspapers to the right size and shove them in between the carpet and the bottom of the box for a cushion. Fill the box with any handy ballast, making it heavy or light, according to who is going to use it, and securely nail on the top of the box. The handle can be made from an old broom handle the whole of which will be none too long. Drive a heavy screweye into the big end of the handle and fasten to the polisher by a staple driven through the eye into the center of the cover, thus making a universal joint. The size of the box given here is the best although any size near that, if not too high, will answer the purpose just as well. The box is pushed or pulled over the floor and the padded side will produce a fine polish.

How to Make a Lady's Card-Case

A card-case such as is shown here makes a very appropriate present for any lady. To make it, secure a piece of "ooze" calf skin leather $4\frac{1}{2}$ by $10\frac{1}{2}$ in. The one shown in the accompanying picture was made of a rich tan ooze of light weight and was lined with a grey-green goat skin. The design was stenciled and the open parts backed with a green silk plush having a rather heavy nap. The lining of goat skin need not cover more than the central part—not the flaps. A piece $4\frac{1}{2}$ by 5



Design for the Cover of Lady's Card-Case

in. will be sufficient. A piece of plush $1\frac{1}{4}$ by 6 in. will be enough for the two sides.

Begin work by shaping the larger piece of leather as shown in the drawing. Allow a little margin at the top and bottom, however, to permit trimming the edges slightly after the parts have been sewed together. A knife or a pair of scissors will do to cut the leather with, though a special knife, called a chip carving knife, is most satisfactory.

The next thing is to put in the marks for the outline of the designs and the borders. A tool having a point shaped as in the illustration is commonly used. It is called a modeling tool for leather and may be purchased, or, one can be made from an ordinary nut pick by taking off the sharpness with fine emery paper so that it will not cut the leather. To work these outlines, first moisten the leather on the back with as much water as it will take and still not show through on the face side. Place the leather on some level, non-absorbent surface and with the tool—and a straightedge on the straight lines—indent the leather as shown. The easiest way is to place the paper pattern on the leather and mark on the paper. The indentations will be transferred without the necessity of putting any lines on the leather.

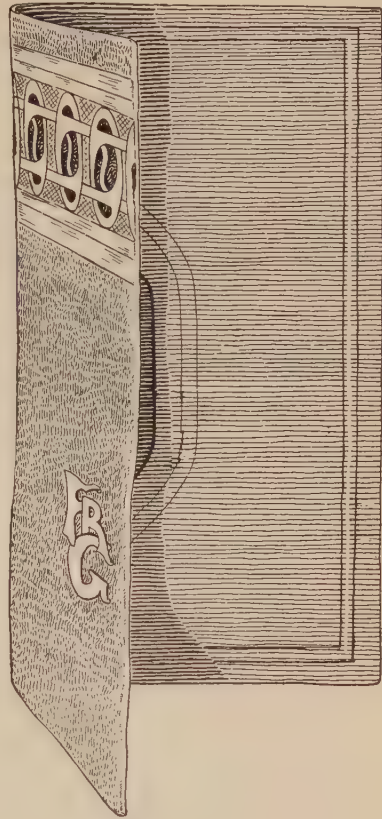
With the knife cut out the stencils as shown. Paste the silk plush to the inner side, being careful not to get any of the paste so far out that it will show. A good leather paste will be required.



Leather Tools

Next place the lining, fold the flaps along the lines indicated in the drawing. Hold the parts together and stitch them on a sewing-machine. An

ordinary sewing-machine will do if a good stout needle is used. A silk thread that will match the leather should be used. Keep the ooze side of the lining



Complete Card-Case

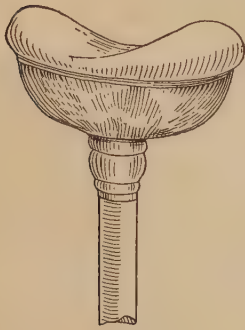
out so that it will show, rather than the smooth side. With the knife and straightedge trim off the surplus material at the top and bottom and the book is ready for use.

Home-Made Fire Extinguisher

Dissolve 20 lb. of common salt and 10 lb. of sal ammoniac in 7 gal. of water, and put the solution in thin glass bottles, cork tightly and seal to prevent evaporation. The bottles should hold about 1 qt. If a fire breaks out, throw one of the bottles in or near the flames, or break off the neck and scatter the contents on the fire. It may be necessary to use several bottles to quench the flames.

Crutch Made of an Old Broom

An emergency crutch made of a worn-out broom is an excellent substitute for a wood crutch, especially



when one or more crutches are needed for a short time, as in cases of a sprained ankle, temporary lameness, or a hip that has been wrenched.

Shorten and hollow out the brush of the broom and then

pad the hollow part with cotton batting, covering it with a piece of cloth sewed in place. Such a crutch does not heat the arm pit and there is an elasticity about it not to be had in the wooden crutch. The crutch can be made to fit either child or adult, and, owing to its cheapness, can be thrown away when no longer needed.—Contributed by Katharine D. Morse, Syracuse, N. Y.

Toy Darts and Parachutes

A dart (Fig. 1) is made of a cork having a tin cap, a needle and some feathers. The needle is run through the center of the cork A and a pin or piece of steel is put through the eye of the needle. Take a quantity of small



FIG. 1

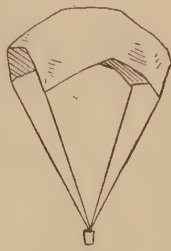


FIG. 2

Dart Parts and Paper Parachute

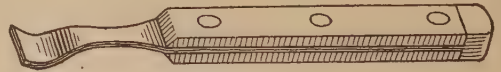
feathers, B, and tie them together securely at the bottom. Bore a hole in the center of the cap C, and fasten the

feathers inside of it. Fasten the cap on the cork and the dart is ready for use. When throwing the dart at a target stand from 6 to 10 ft. away from it.

The parachute is made by cutting a piece of paper 15 in. square and tying a piece of string to each corner. The strings should be about 15 in. long. Tie all four strings together in a knot at the end and fasten them in the top of a cork with a small tack. It is best to be as high as possible when flying the parachute as the air currents will sail it high and fast. Take hold of the parachute by the cork and run it through the air with the wind, letting it go at arm's length.—Contributed by J. Gordon Dempsey, Paterson, N. J.

A Tool for Lifting Can Covers

A handy tool for prying up varnish, paint, syrup and similar can covers can be made from an old fork filed down



Made of an Old Fork

to the shape shown in the illustration. The end is filed to an edge, but not sharp.—Contributed by Ben Grebin, Ashland, Wis.

Keeping Rats from a Chicken Coop

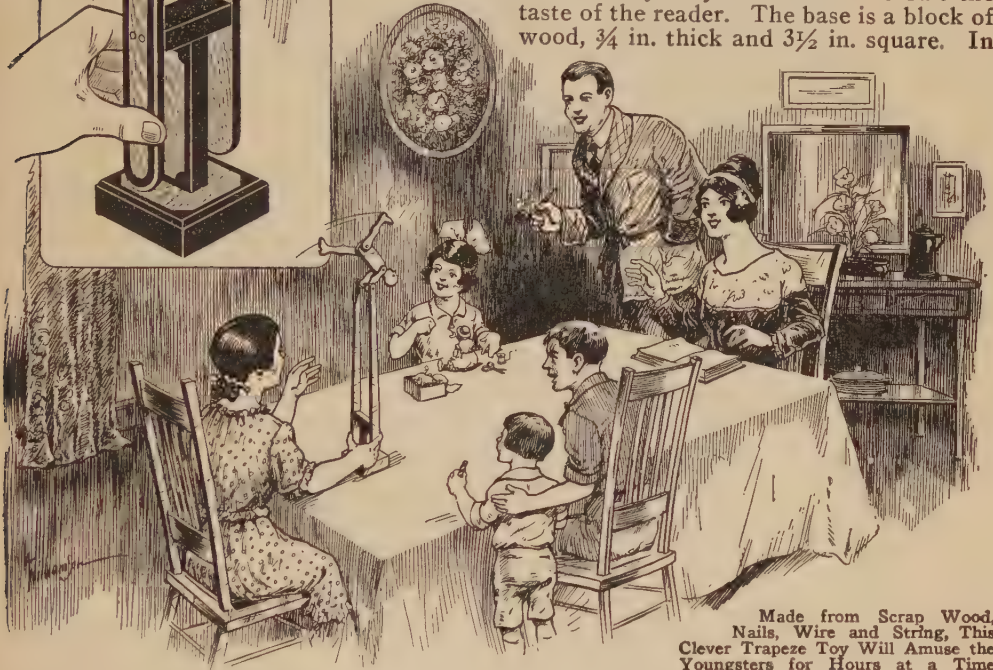
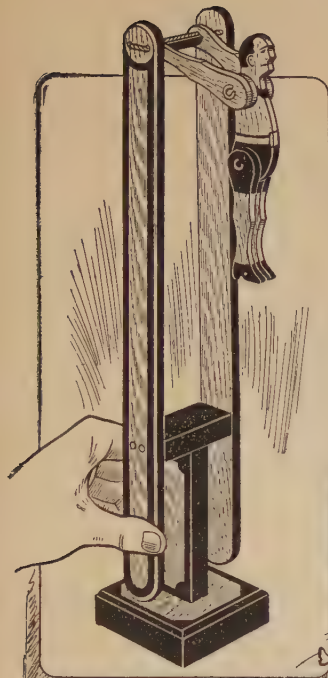
After trying for months to keep the rats from tunneling their way into my chicken coop by filling in the holes, laying poisoned meat and meal, setting traps, etc., I devised a simple and effective method to prevent them from doing harm.

My roosting coop is 5 by 15 ft. There is a 1-in. board all around the bottom on the inside. I used wire mesh having 1/2-in. openings and formed it into the shape of a large tray with edges 6 in. high, the corners being wired, and tacked it to the boards. This not only keeps the rats out, but prevents the chickens from digging holes, thus helping the rats to enter.—Contributed by John A. Hellwig, Albany, N. Y.

Making a Trapeze-Artist Toy

By H. H. SIEGELE

A CLEVER and interesting toy, which will please any child, can be made by anyone in an hour from a few pieces of scrap wood, some nails, wire and a piece of string. The toy, which is made to represent a trapeze performer, can be made to go through a variety of tricks, and will afford a lot of enjoyment to the youngsters. It can be made as sturdy as desired, to stand up under rough handling, and it can also be decorated in various ways with very little trouble, so that it will make a very good all-around addition to the playbox. The dimensions given below apply to the original toy, but, of course, they may be modified to suit the taste of the reader. The base is a block of wood, $\frac{3}{4}$ in. thick and $3\frac{1}{2}$ in. square. In

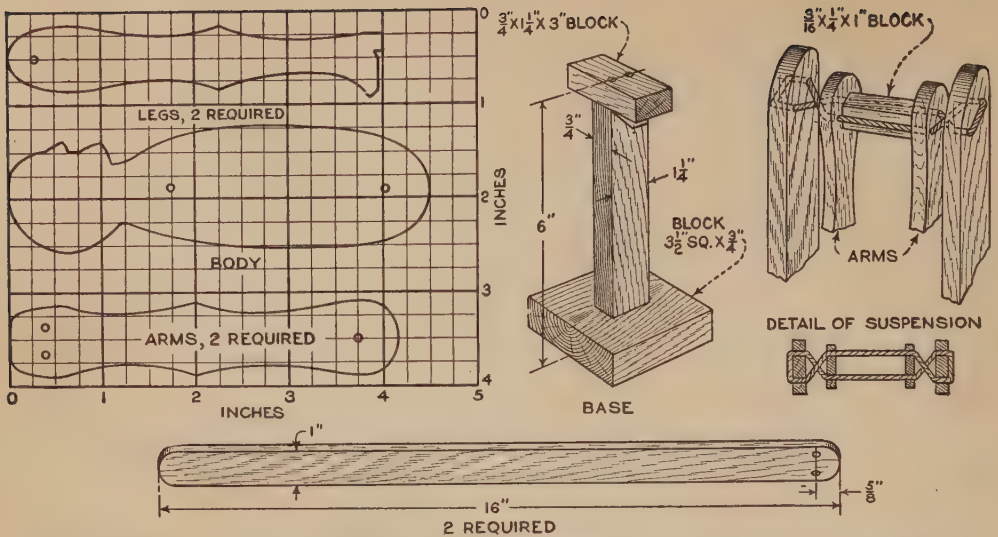


Made from Scrap Wood, Nails, Wire and String, This Clever Trapeze Toy Will Amuse the Youngsters for Hours at a Time

the center of this is nailed an upright or column, $\frac{3}{4}$ in. thick by $1\frac{1}{4}$ in. wide and $4\frac{1}{2}$ in. long. Across the top of this is nailed a crosspiece, $\frac{3}{4}$ in. thick, $1\frac{1}{4}$ in. wide and 3 in. long. The body is cut from wood $\frac{1}{8}$ in. thick. It is best to obtain a piece of material large enough to make the body, arms and legs, and to mark this out in 1-in. squares so that the pieces can be laid out on it in the same manner as shown in the detail drawing. A piece 4 by 5 in. in size will do. If wood as large as this cannot be obtained a piece of paper can be marked off in 1-in. squares and the parts laid out on it at one time, when they can be cut out and pasted down to the smaller pieces of wood to serve as guides for cutting. After they are cut, a small hole to take a piece of thin wire is drilled at the bottom of each arm, the top

of the legs, and at the points where these units are pivoted to the body. Two larger holes, to take the string to be used, are drilled at the tops of the arms, in line with each other.

The arms and legs are then pivoted to the body by means of the wire, looping the latter at each side so that it cannot come out. A small block of $\frac{3}{16}$ -in. wood is tacked or glued between the arms at the top, as shown in the detail. Two strips of wood, 16 in. long and 1 in. wide, are next cut. These should preferably be of hardwood, such as hickory, about $\frac{1}{8}$ in. thick, but if this is unobtainable, soft wood, $\frac{1}{4}$ in. thick, (this was used in the original toy) can be used. Two holes are drilled in the top of each, corresponding to the holes in the top of the arms, and the strips then nailed to the crosspiece.



Layout of the Body, Arms and Legs of the Trapeze Toy, with Details of the Supports and Base; Note Especially How the String Is Run through the Holes in the Top

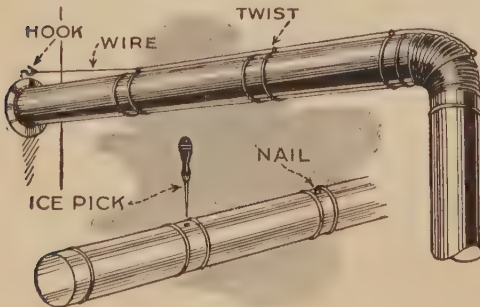
The method of suspending the figure is shown in the detail, and the string must be run through the holes exactly as indicated, else the toy will not perform. Now, by grasping the bottom of the upright strips and squeezing them together, then releasing them, the figure will swing over

the "trapeze," turn somersaults, and perform a number of other tricks.

The figure can be painted flesh color, with black or red trunks, or may even be provided with cloth tights, glued on. The remainder of the toy can be painted in any manner desired.

Holding Stovepipes Securely

Horizontal sections of stovepipe have a tendency to sag and may even slip apart. This trouble can be prevented by tying them together with a length of wire as shown in the upper part of the illustration. The joints are first pushed together and a hook is driven into the wall just above the stovepipe. The wire is tied to the hook and looped around each joint, being pulled up tight while progressing. This is continued until the elbow is reached,



Neat Methods of Holding Horizontal Sections of Stovepipe Together Securely

where the wire is securely twisted and cut off. Another method of preventing the pipes from getting loose is to punch a small hole, at each joint, through the telescoped ends of the pipe sections on the top side, and insert a flat-head nail in each hole, as shown in the lower detail.

Method of Distinguishing Extension Bells

When there are two or more bells in use in the same room, some contrivance is needed to indicate which one has been ringing. Often an annunciator is used, but this imposes some additional load on the telephone line and must also be reset each time a bell rings. A simpler plan, which has been used successfully, is to attach a light coil spring to each bell clapper. The spring is placed in a horizontal position and can easily be fastened by a few drops of solder. When any bell in the room rings, its spring is set in vibration and continues to vibrate for ten or fifteen seconds after the sound ceases. One can then tell at a glance which bell has been ringing.—R. L. Campbell, Bellingham, Wash.

How to Make a "Straddle Bug"

A Simple Sailing Model That Is Easily Built

By WM. ATKIN

Naval Architect

FEW tools are required to make the sailing model described in this article, and there is no tedious shaping and carving to be done on a hull. The hull in this model—if it can be called by this name—is nothing but a simple framework to hold the mast and three floats. This construction, while it does not give the model the speed of a "regular" body, permits the boat to be knocked together

very quickly, and, despite the unconventional design, the little yacht is really a splendid sailer.

Before going on with the details of construction, we will explain a few of the terms used in the drawings, to save trouble later on. The hull, or body of the boat, needs no description, nor does the mast. The latter, however, is braced by five lengths of wire; there are two on each side, running from a point near the top of the mast to the sides of the hull, and these

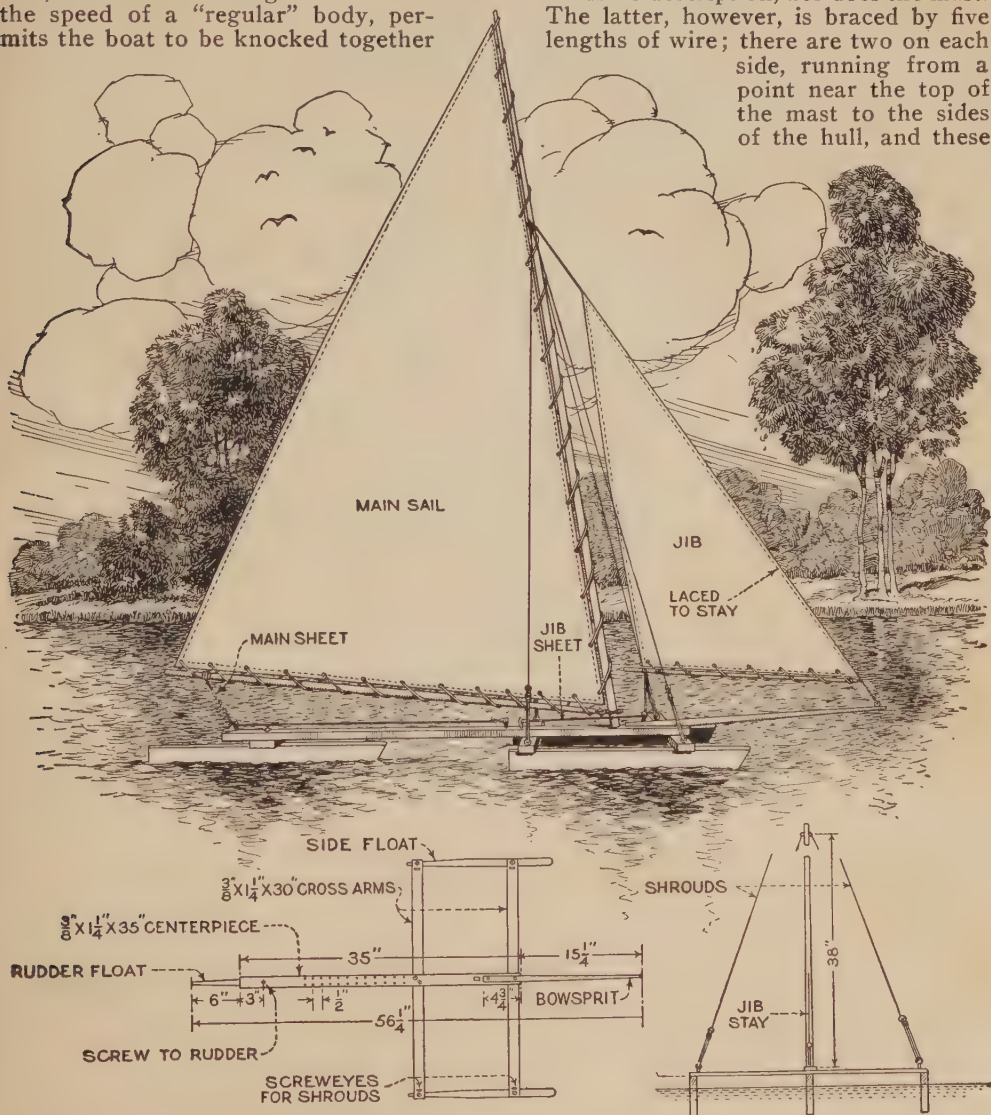
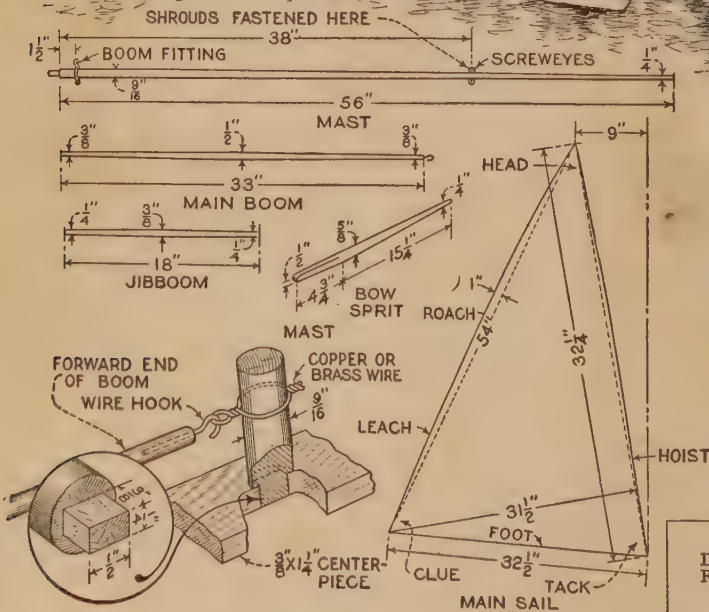
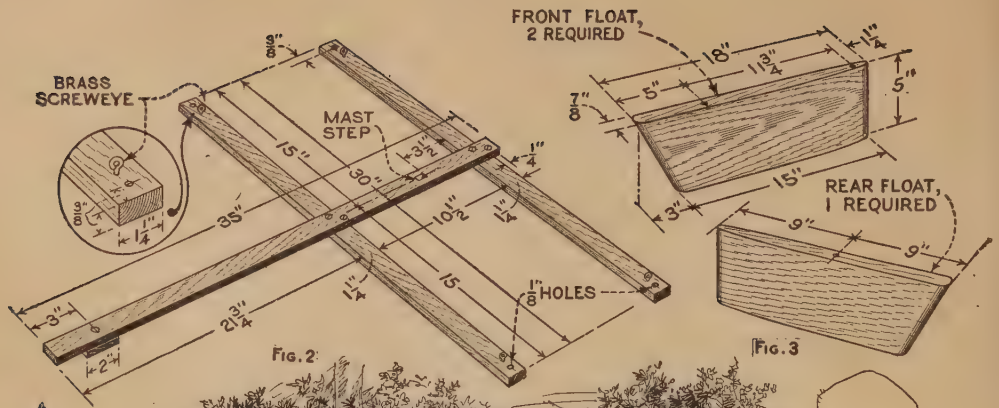


FIG. 1
Above, Elevation of the Simple Sailing Model, the "Straddle Bug"; Below, Plan and End View of Frame



Details of the Frame and Floats, and Dimensions of Mast, Spars and Sails

Fig. 4

Fig. 5

are called shrouds. Another runs from the same point on the mast to the end of the bowsprit, and this is called the jib stay. The bowsprit projects from the bow to carry the end of this stay, and to the stay is fastened the jib, or triangular foresail. The sail nearest the after (rear) end of the model is the mainsail, and in this case it is a "jib-headed" sail. The sails are lashed at the bottom to spars called the main boom and jibboom. On the sails, the upper end is the head, the bottom is the foot, the side next the mast on the mainsail is the hoist or luff, and the opposite side, the leach; on the jib, the side that runs on the jib stay is the hoist, and the inner side the leach. The leach of the mainsail is roached, or curved, to make it keep its shape. The angle that the sails are allowed to take to the centerline of the boat is governed by lines attached to the outer end of the main boom and the inner end of the jibboom, and these lines are the main and jib sheets. The corner of the foot at which the sheet of the sail is fastened is the

clue, and the opposite foot corner is the tack. Now for the construction.

The frame requires three pieces of white pine or poplar, $\frac{3}{8}$ in. thick by $1\frac{1}{4}$ in. wide. Two of these are 30 in. long and the third 35 in. long. Measure $\frac{1}{4}$ in. from one end of the 35-in. piece and fasten one 30-in. piece to it so that the forward edge of the latter comes to the $\frac{1}{4}$ -in. mark, and the crosspiece is exactly central; use two No. 6 brass screws, $\frac{3}{4}$ in. long. Fasten the other crosspiece similarly, so that the distance between the inner edges of the two is $10\frac{1}{2}$ in. Mark a point $\frac{3}{8}$ in. from the two ends of each crosspiece and in the center, and drill $\frac{1}{8}$ -in. holes, and $1\frac{1}{2}$ in. from each end drive in small brass screweyes for the ends of the shrouds. Measure 3 in. from the after end of the

centerpiece, and glue to the underside a block $\frac{3}{8}$ in. thick, $1\frac{1}{4}$ in. wide and 2 in. long, keeping the center of the block on the 3-in. mark. Drill a $\frac{1}{8}$ -in. hole through both centerpiece and block, on the mark.

Three floats must now be made. Make these of white pine or poplar, 18 in. long, 5 in. deep and $\frac{7}{8}$ in. thick. On two of them, cut one end as shown in the drawing, so that the bottoms are 15 in. long, round off the beveled ends, and, from a point about 7 in. from the after end, taper the floats so that they are about $\frac{1}{8}$ in. thick at the after edges, then round these. Drill $\frac{1}{16}$ -in. holes in the positions marked, and then fasten the floats to the ends of

the crosspieces with No. 6 brass screws, $1\frac{1}{2}$ in. long. The third, or rudder float, is exactly similar to the others, except that only one $\frac{1}{16}$ -in. hole is drilled in it, exactly in the center, and but one screw used to fasten it to the centerpiece, under the little block. Now drill two rows of $\frac{1}{16}$ -in. holes along the edges of the centerpiece (Fig. 6), spacing them $\frac{1}{2}$ in. apart, for the pins on the end of the sheets,

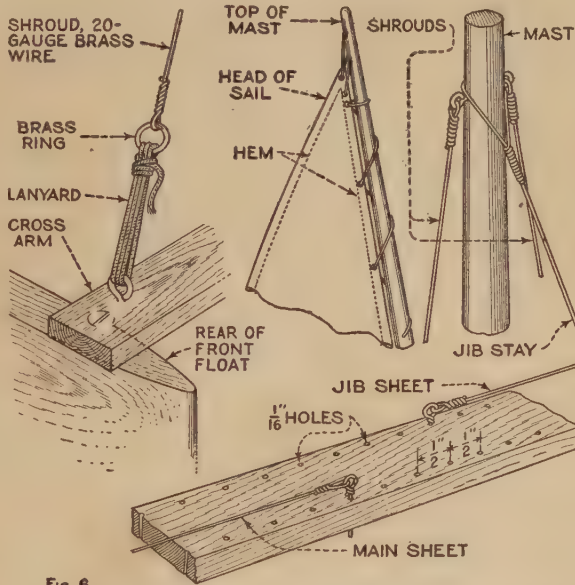


FIG. 6
Details of Shroud and Stay Fittings, Mainsail Lashing and Sheet Pins and Holes in Centerpiece

and cut out the mast step or hole. This hole is oblong in shape, $\frac{1}{4}$ in. wide and $\frac{1}{2}$ in. long, and should not be finished until the mast is ready to be "stepped." (See Fig. 4).

All of the spars are also made of white pine or poplar, and, when tapering these as shown in the drawings, the best way to go about the job is this: Taking the mast as an example, cut it a trifle longer than necessary, and about $\frac{3}{4}$ in. square. Still keeping it square, plane it down until it is $\frac{9}{16}$ in. square at one end and $\frac{1}{4}$ in. square at the other, the taper being straight. Now plane off the edges carefully until an octagon is produced, and plane off the edges of this in the same way. The mast can now be finished round with coarse and fine sandpaper without difficulty, cut to

length, the top rounded, and the oblong step cut on the foot. Notice that the main boom and jibboom taper from the center to the ends, and that the bowsprit tapers and is round only for $15\frac{1}{4}$ in. of its length. The inner end tapers a little, but is kept square to make it easy to fasten it to the "deck." Measure 38 in. from the deck shoulder of the mast and at this point drive in small brass screweyes to take the ends of the shrouds (Fig. 4). A piece of copper or brass wire is twisted around the lower part of the mast, $1\frac{1}{2}$ in. from the shoulder, and formed into an eye on the after side to take a brass hook on the end of the main boom. This is shown clearly in Fig. 4. Now step the mast so that it "rakes" or leans aft 9 in. from the vertical, measured at the top, and glue into place. The shrouds, which are of 20-gauge brass wire, can now be fitted. Each shroud is passed through the screweyes on the mast, twisted as in Fig. 6, and, about 2 in. from the deck, is passed through a small brass ring, then twisted around itself and cut off. Now, fasten one end of a length of fine fishing line to each ring, and pass them several times through the deck screweyes and the ring (Fig. 6). By drawing on these lines or lanyards, the shrouds are set up (tightened) and the mast straightened. The shrouds should not be set up until the jibstay is in place or the mast may be sprung (bent). The stay is formed with a loop on the upper end that passes over the end of the mast and rests on the screweyes; the other end is fastened to a small brass screweye on the

end of the bowsprit, as seen in Fig. 1. The sails are made of light-weight percale, and must be cut so that a $\frac{3}{8}$ -in. hem may be made on all sides. Remember that there is a 1-in. curve (roach) on the leach of the mainsail and a slight roach (about $\frac{1}{4}$ in.) on the hoist. The edges of the jib are straight. Twelve small holes are punched through the foot of the mainsail and 15 on the hoist; if small eyelets like those used on shoes can be put in these, so much the better—maybe the shoemaker will do this for you. Seven are also put through the foot of the jib, and about 12 on the hoist. The sails are laced to the booms, stay and mast through these eyelets by means of light fish line, as shown in Figs. 1 and 6. There are two small holes drilled at the head of the mast to take the end of the lacing and make it fast, and similar holes in the booms. The lacing on the hoist of the jib can be taken to the shroud screweyes and made fast there. The only work left now is the sheets. These are also of strong fish line. One end of the jib sheet is fastened to the after end of the jibboom, reeved through a screweye near the after end of the bowsprit and passed aft; it is then cut off near the end of the row of holes in the centerpiece, and fitted with a pin made of brass wire (see Fig. 6). The main sheet is fastened to the after end of the main boom, and leads down through the screweye in the end of the centerpiece, then forward.

The rudder screw should bind the rudder float tightly, but not so tightly that the float cannot be moved with the fingers.



Wire Attachment on End of Stick Facilitates Removing Clothes from Boiler

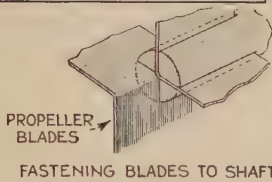
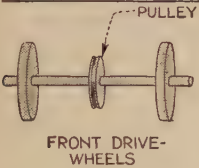
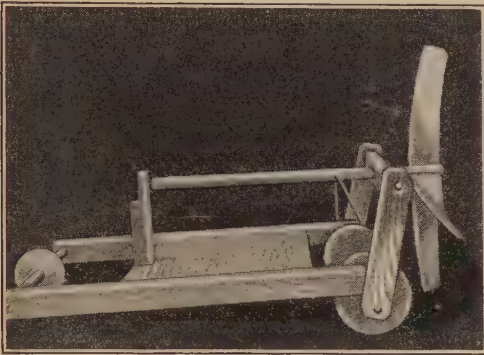
A Handy Tool for Washday

Most women use a short piece of broomstick for lifting wet clothes out of the boiler. The trouble with a round stick is that the clothes slip off while the stick is being turned to wind them on. A length of heavy galvanized-iron wire, bent and inserted through two holes drilled in the stick, as shown in the detail, will eliminate the trouble entirely. When the stick is turned the wire catches in the clothes without any danger of tearing them, and they can then readily be removed.—E. K. Wehry, Cedar Rapids, Iowa.

¶ Short lengths of $\frac{3}{4}$ -in. pipe driven at the corners of the flower beds prevent the hose from dragging over the bed and knocking down the flowers. The pipes should be at least 18 in. long and should extend 6 in. or more above the ground.

Wind-Propelled Toy Wagon

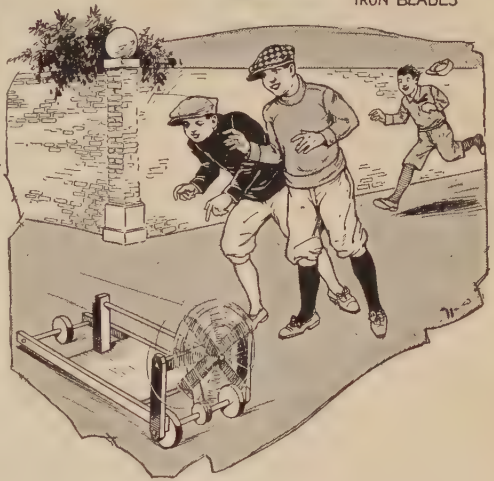
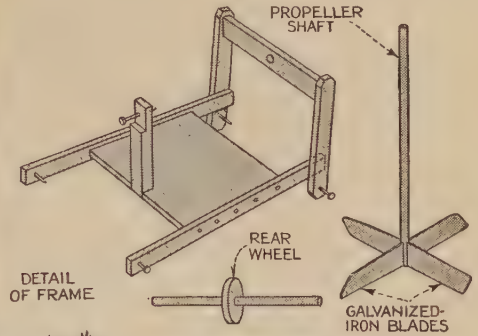
Any boy will be interested in a toy wagon equipped with a propeller, which drives it ahead against the wind. It is



Self-Propelling Wind Wagon That Any Boy Can Build; It Consists of a Light Wooden Frame and Has a Sheet-Metal Propeller Which Drives It against the Wind with Surprising Speed

made entirely of wood with the exception of the propeller blades, which are cut from some light sheet metal. The proportions of the various parts of the wagon can be approximated from the photos and drawings. The wagon has three wheels, although four can be used if desired. The wheels are fixed rigidly on the axles, and the latter are held to the frame by means of nails driven into them through holes that serve as bearings, as shown. The propeller shaft is also of wood and is mounted, in the same manner as the wheel axles, in the short upright at the rear and through a crosspiece in front, so that it extends beyond the crosspiece sufficiently

for the mounting of the propeller. This is made from two short lengths of light sheet metal, each being bent over at right angles in the center to form two blades, and inserted in the shaft, for which purpose the shaft is split as shown. The



blades are then twisted to give them the necessary pitch. A twisted cord over the propeller shaft and around the pulley between the front wheels transmits the wind power to the wheel axle, thus driving the car forward against the wind.—
R. W. Wagner, Ayrshire, Iowa.

Lino-Fronted Easel Makes Pinning of Paper Easy

Pinning bromide paper to the wooden easels generally used with enlarging apparatus is a difficult job, as a fair amount of pressure must be used to force the pin into the easel, and this pressure may force the easel out of adjustment.

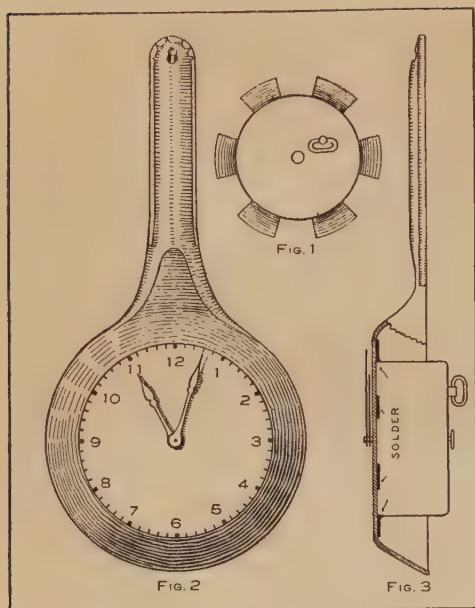
By covering the front of the easel with thick cork linoleum, these difficulties are at once overcome, for the pin is forced into the surface with the slightest pressure.

Moreover, the lino is elastic, and the holes made close up again, so that the easel front always shows an even surface.

A piece of thick linoleum is cut to the same size as the easel board and glued to the latter. While the glue is setting, a board of the same size as the easel is clamped over the lino-covered front, to make sure that the surface will be smooth all over. The bromide paper is pinned on in the usual way. The thickness of the linoleum should be such that the point of the pin cannot penetrate it.

Novelty Clock for the Kitchen

An inexpensive and easy way to make an unique ornament of a clock



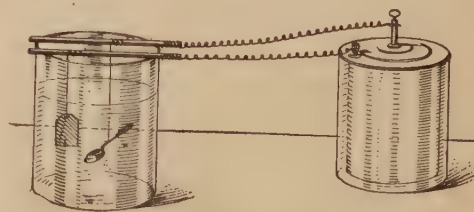
The Clock with Holder

for kitchen use is to take an old alarm clock or a new one if preferred, and make it into a clock to hang on the wall. Take the glass, dial and works out of the shell and cut some pieces out of the metal so that when the pieces left are turned back it will have the appearance as in Fig. 1. Then get a 10-cent frying pan, 6 in. in diameter, and drill a hole in the center so the shaft for the hands will easily pass through and extend out far enough to replace the two hands. Put the works back in the metal shell and solder it to the frying pan by the pieces turned out as in Fig. 2. Gild the pan all over, including the handle, and print black figures in the small circles. Calendar figures can be pasted on small circles and these pasted on the frying pan. The parts can be divided into minutes with small lines the same as shown in the drawing. Make new hands that are long enough to reach the figures from sheet brass or tin and paint them black.—Contributed by Carl P. Herd, Davenport, Iowa.

How to Make a Small Silver Plating Outfit

Take an ordinary glass fruit jar or any other receptacle in glass, not metal, which will hold 1 qt. of liquid and fill it with rain or distilled water and then add $\frac{3}{4}$ oz. of silver chloride and $1\frac{1}{2}$ oz. of c. p. potassium cyanide. Let this dissolve and incorporate well with the water before using. Take an ordinary wet battery and fasten two copper wires to the terminals and fasten the other ends of the wires to two pieces of heavy copper wire or $\frac{1}{4}$ -in. brass pipe. The wires must be well soldered to the brass pipe to make a good connection. When the solution is made up and entirely dissolved the outfit is ready for plating.

Procure a small piece of silver, a silver button, ring, chain or anything made entirely of silver and fasten a small copper wire to it and hang on the brass pipe with connections to the carbon of the battery. Clean the article to be plated well with pumice and a brush saturated in water. When cleaning any article there should be a copper wire attached to it. Do not touch the article after you once start to clean it, or the places touched by your fingers will cause the silver plate to peel off when finished. When well scoured, run clear, cold water over the article and if it appears greasy, place in hot water. When well cleaned place in the plating bath and carefully watch the results. If small bubbles come to the surface you will know that you have too much of the anode or the piece of silver hanging in the solution and you



Plating Jar and Battery

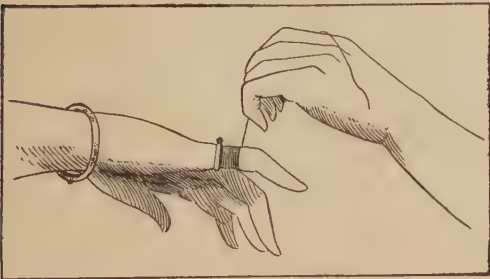
must draw out enough of the piece until you can see no more bubbles. Leave the piece to be plated in the solution

for about one-half hour, then take the article out and with a tooth brush and some pumice, clean the yellowish scum off, rinse in clear water and dry in sawdust. When thoroughly dry, take a cotton flannel rag and some polishing powder and polish the article. The article must have a fine polish before plating if it is desired to have a finely polished surface after the plate is put on.

In order to see if your battery is working, take a small copper wire and touch one end to the anode pipe and the other end to the pipe holding the article to be plated. When these two parts touch there will be a small spark. Always take the zincs out of the solution when not in use and the batteries will last longer. This description applies only to silver plating. Articles of lead, pewter, tin or any soft metal cannot be silver plated unless the article is first copper plated.

Removing a Tight-Fitting Ring from a Finger

When a ring cannot be removed easily from the finger, take a string or thread and draw one end through between the ring and the flesh. Coil the other end of the string around the finger covering the part from the ring to and over the finger joint. Uncoil the string by taking the end placed through the ring and at the same time keep the ring close up to the string. In this way the ring can be easily slip-



Wrapping the Finger

ped over the knuckle and off from the finger.—Contributed by J. K. Miller, Marietta, Penn.

A Photographic Jig-Saw Puzzle

Take any photographic print and mount it on heavy cardboard, or, if you



Picture Marked for Cutting

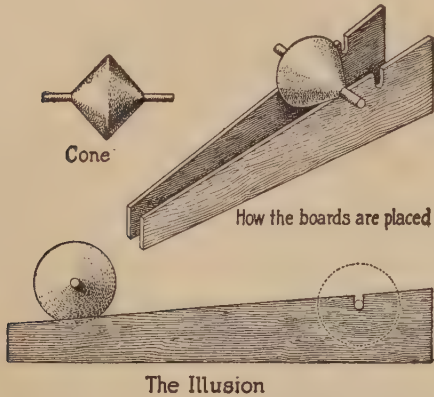
have a jig saw, a thin smooth wood board and mark out various shaped pieces as shown in the accompanying cut. If the picture is mounted on cardboard, the lines can be cut through with a sharp pointed knife. If you have a jig saw, you can make a bromide enlargement from the negative you have selected and mount the print on a smooth board that is not too thick. This wood-mounted picture can be sawed out making all shapes of blocks, which forms a perfect jig-saw puzzle.—Contributed by Erich Lehmann, New York City.

Rolling Uphill Illusion

This interesting as well as entertaining illusion, can be made by anyone having a wood-turning lathe. A solid, similar to two cones placed base to base, is accurately turned in a lathe, the sides sloping to an angle of 45 deg. The spindle can be turned out of the solid at the same time as the cone; or, after turning the cone, drive an iron or wood shaft through the center making a tight fit.

The boards for the track are made with a sloping edge on which the cone is to roll. This slope will depend on the diameter of the cone, which can be

any size from 3 to 12 in. The slope should not be too flat, or the cone will not roll, and it should be such that the



one end will be higher than the other by a little less than half the diameter of the cone. Thus it will be seen that the diameter of the cone determines the length of the slope of the tracks. A notch should be cut in the tracks, as indicated, for the shaft to drop into at the end of the course.

The lower end of the tracks are closed until the high edge of the cone rests upon the inside edges of the tracks and the high end spread sufficiently to take the full width of the cone and to allow the shaft to fall into the notches. When the cone and tracks are viewed from the broadside the deception will be more perfect, and will not be discovered until the construction of the model is seen from all sides. Should it be difficult to make the cone from wood, a good substitute can be made from two funnels.—Contributed by I. G. Bayley, Cape May Point, N. J.

Annealing Chisel Steel

Persons who have occasion to use tool or carbon steel now and then and do not have access to an assorted stock of this material find that the kind most readily obtained at the hardware store is the unannealed steel known as chisel steel. Machining or filing such steel is exceedingly slow and difficult, besides the destruction of tools; as a matter of fact this steel is intended for

chisels, drills, and like tools which require only forging and filing. If this steel is annealed, it can be worked as easily as the more expensive annealed steel.

Annealing may be done by heating the steel to a cherry red, not any more, and burying it in a box of slaked lime, where it is allowed to remain until all the heat is gone. If well done, the metal will be comparatively soft and in a condition to machine easily and rapidly. In lieu of lime, bury in ashes, sand, loam, or any substance not inflammable, but fine enough to closely surround the steel and exclude the air so that the steel cools very slowly.

If possible, keep the steel red hot in the fire several hours, the longer the better. In certain processes, like that of file manufacturing, the steel blanks are kept hot for 48 hours or more. Where it is impossible to wait so long as the foregoing method takes, then a cold water anneal may be used with less time. This method consists of heating the work as slowly and thoroughly as the time will permit, then



The above photograph was made by first printing a maple leaf on the paper, not too dark, then printing on top the picture from the negative, and finished in the usual way.

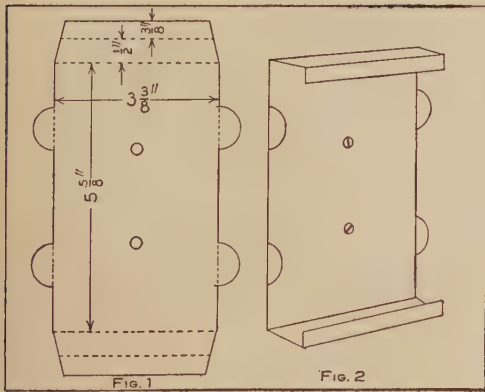
removing the steel from the fire and allowing it to cool in the air until black and then quenching in water.

In addition to softening the steel, annealing benefits the metal by relieving strains in the piece. Should a particularly accurate job be called for, the steel should be annealed again after the roughing cuts have been taken and before machining to the final size. This will insure a true job and diminishes the danger of spring in the final hardening.—Contributed by Donald A. Hampson, Middletown, N. Y.

How to Make a Post Card Holder

This holder is designed to lay flat on the counter or to stack one on top of the other, keeping each variety of cards separate, or a number of them can be fastened on any upright surface to display either horizontal or vertical cards.

The holders can be made from sheet tin, zinc, brass or aluminum. The dimensions for the right size are given in Fig. 1; the dotted line showing where the bends are made. The com-



Pattern for Cutting the Metal

pleted holder is shown in Fig. 2 as fastened to a wall.—Contributed by John F. Williamson, Daytona, Fla.

Do not allow paint that is left over from a job to stand uncovered. The can should be tightly sealed and the paint will be found suitable for use for several days.

Perfume-Making Outfit

The real perfume from the flowers is not always contained in the liquid purchased for perfume. The most expensive perfume can be made at home for less than 10 cents an ounce. The outfit necessary is a large bottle or glass jar with a smaller bottle to fit snugly into the open mouth of the large one. Secure a small piece of very fine sponge and wash it clean to thoroughly remove all grit and sand.



Saturate the sponge with pure olive oil, do not use strong oil, and place it inside of the smaller bottle.

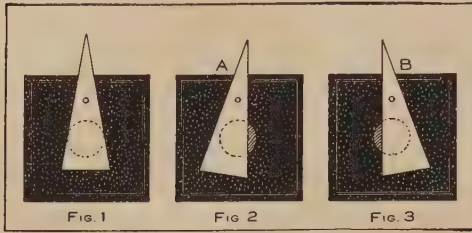
Fill the large bottle or jar with flowers, such as roses, carnations, pansies, honeysuckles or any flower having a strong and sweet odor. Place the small bottle containing the sponge upside down in the large one, as shown in the illustration.

The bottle is now placed in the sun and kept there for a day and then the flowers are removed and fresh ones put in. Change the flowers each day as long as they bloom. Remove the sponge and squeeze out the oil. For each drop of oil add 2 oz. of grain alcohol. If stronger perfume is desired add only 1 oz. alcohol to each drop of oil.

Home-Made Duplicator for Box Cameras

The projecting tube of the lens on a hand camera can be easily fitted with a duplicator while the box camera with its lens set on the inside and nothing but a hole in the box does not have such advantages. A small piece of heavy cardboard can be made to

produce the same results on a box camera as a first-class duplicator applied to a hand camera. The card-

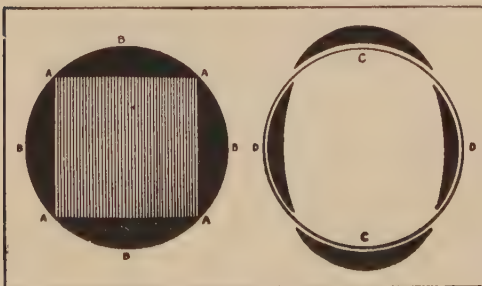


Duplicator Attached to a Camera

board is cut triangular and attached to the front end of the camera as shown in Fig. 1 with a pin about 1 in. above the lens opening. A rubber band placed around the lower end of the cardboard and camera holds the former at any position it is placed. A slight pressure of the finger on the point A, Fig. 2, will push the cardboard over and expose one-half of the plate and the same pressure at B, Fig. 3, will reverse the operation and expose the other one-half. Pins can be stuck in the end of the camera on each side of the lens opening at the right place to stop the cardboard for the exposure. With this device one can duplicate the picture of a person on the same negative.—Contributed by Maurice Baudier, New Orleans, La.

Optical Illusions

The accompanying sketch shows two optical illusions, the first having a perfect circle on the outside edge ap-



The Two Illusions

pears to be flattened at the points A, and the arcs of the circle, B, appear to be more rounding. In the second fig-

ure the circle appears to have an oval form with the distance from C to C greater than from D to D. A compass applied to the circles in either figures will show that they are perfectly round.—Contributed by Norman S. Brown, Chippewa Falls, Wis.

Use of Kerosene in Polishing Metals

Anyone who has polished a flat iron or steel surface with emery cloth knows how soon the cloth gums and fills up. The cloth in this condition will do little or no cutting. A simple remedy for this trouble is to use kerosene on the surface. The oil floats away a large part of the gumming substance and leaves the emery cloth sharp and clean to do the best work, also, it seems to act as a lubricant to keep particles of metal from collecting on the cloth and scratching or digging in the surface of the metal. A very light lard oil is equally good for this purpose, but not always easily obtained. A surface polished where oil or kerosene is used does not rust so easily as one polished dry, for the reason that a little oil remains on the metal.

Kerosene is the best to use on oil stones, being better than heavier oil. This oil readily floats away all particles of the feather edge that are liable to become loosened and forced into the stone. These particles of metal when stuck to the stone are the cause of spoiling it, as well as nicking the tools that are being sharpened. Keep the surface of the stone well oiled at all times to make the cutting free.—Contributed by Donald A. Hampson, Middletown, N. Y.

How to Make Lamps Burn Brightly

For a good, steady light there is nothing better than a lamp, but like most everything it must have attention. After cleaning well and fitting it, place a small lump of camphor in the oil vessel. This will greatly improve the light and make the flame clearer and brighter. If there is no camphor at hand add a few drops of vinegar occasionally.



A Miniature Replica of the Old Homestead Is Used as a Mail Box, Adding a Pleasing and Artistic Touch to an Object Usually Ugly, if Useful

An Unusual and Attractive Mail Box

By L. W. WILLIAMS

IN these days of widespread use of the parcel post, when the mailman may bring anything from a pair of shoes to an automobile tire, it is desirable to have a package box to receive his burdens. This is particularly true in the country, where the rural carrier drives a small car and leaves the mail at the roadside.

A box—any old box—will not give full protection from the weather, however, and certainly is not ornamental. For these reasons the residents around Lake Mahopac, N. Y., have adopted the custom

of making little houses, exact models of their respective homes, which they set on posts at the roadside. The effect of these miniature houses along the road is very attractive. Unless the house to be modeled is very irregular in outline the making of the miniature is not very difficult. Let us take an old New England farmhouse, for example. In case one would like to have a mail-box house, but did not care to duplicate one's own, this type could very well be used. It is simple in design, but the effect is artistic and pleas-

ing. The house is square on the base. A moderate size would be 24 in. square. Boards, preferably tongued and grooved, should be cut to form a base of this size. Next, enough boards must be cut to form the two ends of the house, which is $16\frac{1}{2}$ in. to the ridge. These boards should be the length of the base plus twice the thickness of the lumber. The boards are fitted together and the roof line laid out for one end. It will be noticed that the roof angle is the same on both sides, one side simply extending lower than the other. One end should be sawed first and then used as a template for the other, so as to insure both being alike. The front side of the house may now be fitted, the top edge being planed to the pitch of the roof. The low side may be fitted in the same way or, to make the effect more interesting, it may be set in 4 in. from the edge of the sides to form a back "porch." The roof boards should be cut the exact length of the

house, with no overhang. One side of the roof is nailed securely and the other, held together with battens, hinged to the ridge to form the door. Now comes the finishing. The box is first painted, inside and out, preferably two coats and white. The outside white may serve as window glass, the frames being painted another color. The painting done, the next job is shingling. The shingles may be cut from the thin ends of regular shingles, making them 2 in. long and preferably of various colors. Small-head nails are used to fasten them. As in shingling a large house, the work should proceed from the lower edge of the roof and from the base of the walls.

As a finishing touch, strips of thin lumber are fitted beneath the shingle overhang at the ends of the roof, covering the ends of the roof boards and fitting down over the side shingles. The same method may be used to finish the corners. The house is now finished, ready for mounting.

A Broom and Brush Holder

Brooms and brushes are usually set up in a corner on the porch when not in use, but this causes the bristles or hairs to



Broom and Brush Holder Which Protects and Keeps Them in an Orderly Arrangement

bend over permanently, which greatly impairs the usefulness of these articles. This can be prevented by providing a brush and broom holder of the kind shown in the drawing. This holder adds considerably to the neat appearance of the porch

and provides an orderly arrangement so that any brush, broom or mop can instantly be found when needed. The construction of this holder is clearly shown in the drawing. It is made of $\frac{3}{4}$ -in. boards about 8 in. wide. The length should be about 3 ft. and the height about the same. A number of holes are drilled through the two shelves, those in the upper shelf being directly above those in the lower shelf, permitting the handles of brooms to be set up vertically. Hooks, driven into the edges of the shelves and sides as indicated, hold the smaller brushes.—F. L. Minter, Newberry, Mich.

Weighing Light Objects on Large Scale

Every farmer has felt the need, at one time or another, of a small, accurate scale when careful weighing of spray ingredients or similar substances was necessary. Such scales are expensive, but the large portable platform scales found on almost every farm can be made to serve the same purpose in a very simple manner. The method sounds a bit involved in description, but is in reality simplicity itself.

Suppose, for example, that it is desired to weigh a small part of some machine that is to be sent to the factory for replacement. The part is so light, however, that it cannot be weighed on the platform scale in the usual way. Tie a piece of string to it, leaving a loose loop. Now stand on the scale, after seeing that it is balanced correctly, and weigh yourself. Jot down the

weight on a piece of paper. Remain on the scale, remove the 100-lb. balance weight, and substitute the machine part, using the loop to hook it onto the balance arm, then weigh yourself again. Record this reading under the first, subtract the second reading from the first, point off two decimal places, and the result is the correct weight of the part.

To illustrate: Suppose your own weight is found to be 176.75 lb. After removing the 100-lb. weight and substituting the part, by balancing again you get a weight of 74.25 lb. By subtracting the second from the first 102.50 lb. is obtained. Pointing off two decimal places gives 1.025 lb.—the correct weight of the part. If this weight is verified on an accurate small scale, it will be found correct to the third decimal place—which is a whole lot more accurate than required for most farm purposes. Objects weighing only a fraction of a pound can be weighed in the same way with equal accuracy.—Joseph H. Hughes, Madison, Wis.

Electric Heater Made from Auto Parts

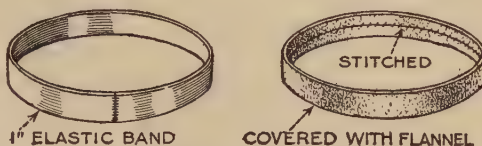
The photo shows a novel electric heater, made entirely from discarded automobile parts, with the exception of the heating unit, which is a standard one kept in stock by electric-supply houses. The base is made from a Ford brake drum and hub flange, the latter being reversed so that the larger opening of the tapered hole is at the top. The standard is made from a headlight bracket to which the reflector is attached. The rim is fastened to the bracket with two screws, which

swivel in holes drilled for the purpose. It is necessary to enlarge the hole in the receptacle for the porcelain socket. A wire is wrapped around the shell and the ends twisted to hold the socket on the reflector. The heating element is screwed into the socket like an ordinary electric lamp, and a 10-ft. length of heavy lamp-cord, with a plug at one end, is provided so that the heater can be used almost anywhere.—E. W. Willat, Culver City, Calif.



Polishing Trolling Spoons

Bass, lake trout, muskies, salmon and other game fish that pleasure anglers usually catch by trolling, do not bite on spoons



Motorboat Flywheel Used as Buffer to Polish Trolling Spoons and Other Fishing Lures

or other lures unless these are highly polished. Keeping them so is not easy, especially when fishing in salt water, which corrodes and tarnishes them quickly.

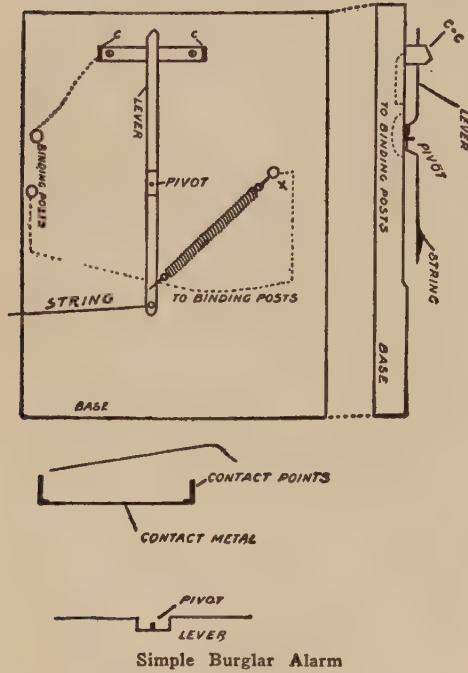
The lures can be polished very quickly, however, and with little work, by using the flywheel of the motor as a buffing wheel. A 1-in. elastic band, a little shorter than the circumference of the flywheel, is sewed together at the ends and a flannel strip stitched around it, as shown in the upper detail. This can be kept in the tackle box and stretched around the flywheel in a moment when needed. Jewelers' rouge may be used as an abrasive, a stick of it being handy for rubbing into the flannel, but this is not absolutely necessary.

With this polisher, a large brass salmon spoon that is badly tarnished can be polished in a few moments while the boat is under way to the fishing grounds. This device was made for use with an outboard motor, but can, of course, be used on the flywheel of any other type.

☐ A corncob, dipped in melted resin and then left to dry, makes an effective fire lighter. It will even ignite wet wood. This method has been in long use by a Louisiana swamp fisherman.

How to Make a Simple Burglar Alarm

Take a piece of any wood about 6 by 8 in. for the base. This may be finished in any way desired. For the contact points use brass or any sheet metal



which will be satisfactory. Take a piece about $2\frac{1}{2}$ or 3 in. in length and bend the ends up about $\frac{1}{2}$ in. in a vertical position as shown. Fasten this to the top of the board using screws or nails. Under this strip of metal fasten a copper wire which can be connected to a binding-post on the board if desired. Take another piece of metal about $4\frac{1}{2}$ in. in length and make a lever of it in the shape shown in the diagram. Fasten this so that one end of it will swing freely, but not loosely between the ends of the other piece marked C-C. Near the end fasten a spiral spring, S, which can be obtained almost anywhere. Fasten the end of this to the screw marked X. Also fasten to this screw a copper wire leading to the binding-post. In the lower end of the lever make a small hole to fasten a string through.

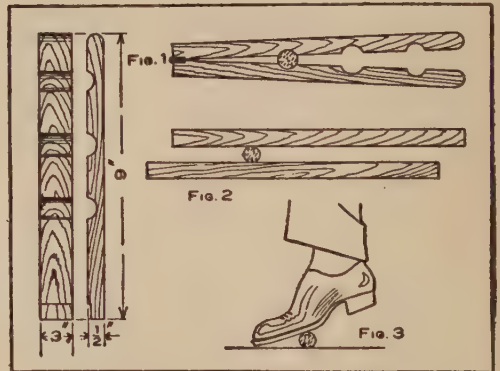
This string may be fastened across a

door or window and any movement of it will pull it to the contact point on the right. If the string is cut or broken the spring will pull the lever to the contact point on the left and thus complete the circuit. If the string is burned it will also act as a fire alarm.

How to Fit Corks

Occasionally odd-sized bottles are received in stores which require corks cut to fit them. No matter how sharp a knife may be, it will leave some sharp edges after cutting the cork, which will cause leakage. The illustration shows three very effective methods of reducing the size of corks. The one shown in Fig. 1 is made from two pieces of $\frac{1}{2}$ -in. wood fastened together at one end with a common hinge. Two or three grooves are cut cross-wise in sizes desired. The cork is put into the groove and both pieces are pressed together, which will make the cork smaller.

Rolling the cork between two flat



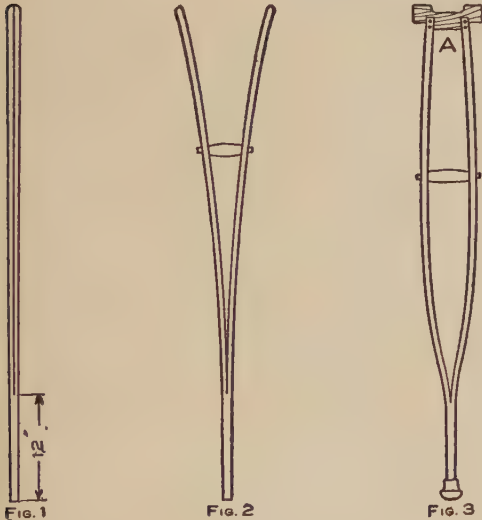
Three Methods for Reducing Size of Corks

surfaces (Fig. 2) is simple and almost as good as pressing in the grooves. A cork rolled on the floor (Fig. 3) is a quick and effective way. A slower and equally as good way is to soak the cork in hot water for a short time.—Contributed by L. Szerlip, Brooklyn, N. Y.

Standing at the cylinder end and looking toward the flywheel of an engine, the wheel will be at the right if the engine is right-hand.

Home-Made Crutch

While a fractured bone was healing in the limb of my boy he needed a pair of crutches and not being able to secure the right length, I set about to make the crutches from two broom handles. I split the handles to within 1 ft. of the end (Fig. 1) with a rip saw, and then stuck them in a barrel of water for three days to make the wood pliable for bending. A grip for each stick was made as long as the hand is wide and a hole bored through the center the size of a No. 10 gauge wire. These grips were placed between the two halves of each stick at the right distance for the length of the boy's arm and a wire run through both split



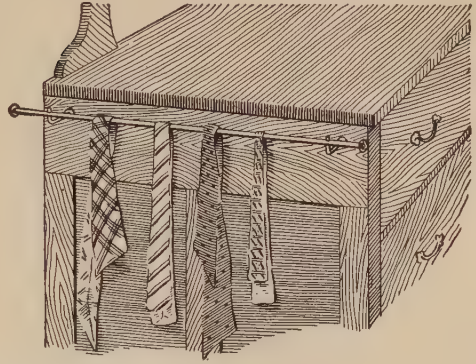
A Broom Handle Crutch

pieces and the handle then riveted as shown in Fig. 2. Another piece was cut as shown at A, Fig. 3, and nailed to the upper ends of each half of the broom handle.—Contributed by Geo. P. Grehore, Nashville, Tenn.

Home-Made Necktie Holder

The gas bracket is considered a good place to hang neckties, even if it does crowd them together. The illustration shows a better method, a curtain rod attached to one end of a bureau. Two long-shanked, square-hooked screws should be used, so they may be screwed

beneath and close up to the projecting top. When removed they will leave no

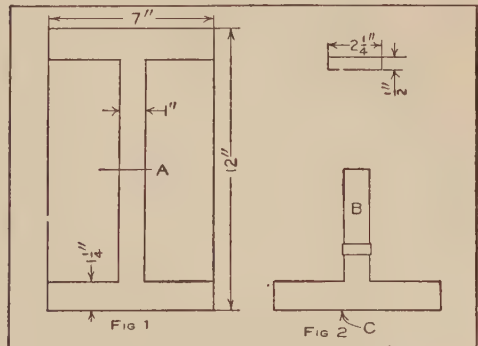


Hanger for Ties

disfiguring holes.—Contributed by C. W. Neiman, New York City.

How to Make a Trousers Hanger

Secure from your tinsmith a piece of sheet metal 7 in. wide and 12 in. long. Cut the metal as shown in Fig. 1 and make a close bend at the point A, but not too close to cause it to break. The piece will then appear as shown in Fig. 2. Cut a piece from the waste material $\frac{1}{2}$ in. wide and $2\frac{1}{4}$ in. long and bend it around the two pieces B, Fig. 2, so it will slide freely on their length. Bend the edges C in for $\frac{1}{8}$ in. to hold the trousers firmly. Drill a hole through the top end of B and attach a wire formed into a hook for use in hanging on a nail. The bottom end of the trousers is inserted between the jaws C and the small ferrule pushed

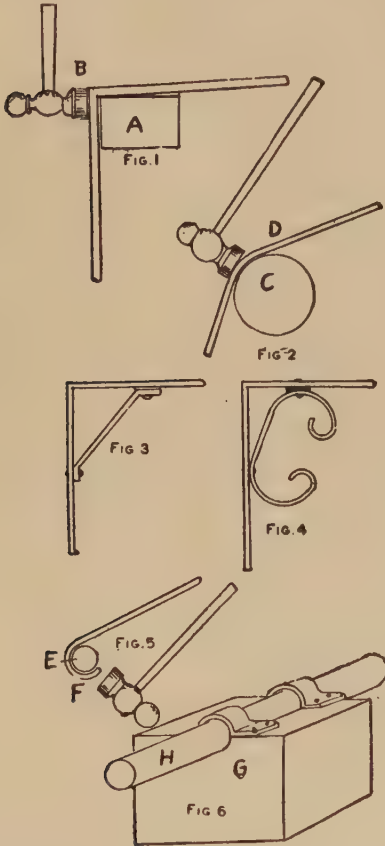


Cut from Sheet Metal

down to clamp them on the cloth.—Contributed by A. Levinson, Saginaw, Michigan.

Easy Designs in Ornamental Iron Work

Many an industrious lad has made money manufacturing the common forms of wood brackets, shelves, boxes, stands, etc., but the day of the scroll



saw and the cigar-box wood bracket and picture frame has given way to the more advanced and more profitable work of metal construction. Metal brackets, stands for lamps, gates, parts of artistic fences for gardens, supporting arms for signs, etc., are among the articles of modern times that come under the head of things possible to construct of iron in the back room or attic shop. The accompanying sketches present some of the articles possible to manufacture.

First, it is essential that a light room be available, or a portion of the cellar where there is light, or a workshop may be built in the yard. Buy a mod-

erate sized anvil, a vise and a few other tools, including bell hammer, and this is all required for cold bending. If you go into a forge for hot bending, other devices will be needed. Figure 1 shows how to make the square bend, getting the shoulder even. The strip metal is secured at the hardware store or the iron works. Often the strips can be secured at low cost from junk dealers. Metal strips about $\frac{1}{2}$ in. wide and $\frac{1}{8}$ in. thick are preferable. The letter A indicates a square section of iron, though an anvil would do, or the base of a section of railroad iron. The bend is worked on the corner as at B, cold. If a rounded bend is desired, the same process is applied on the circular piece of iron or the horn of an anvil. This is shown in Fig. 2, at C. This piece of iron can be purchased at any junk store, where various pieces are always strewn about. A piece about 20 in. long and 4 in. in diameter is about the right size. The bend in the metal begins at D and is made according to the requirements. Occasionally where sharp bends or abrupt corners are needed, the metal is heated previous to bending.

Although the worker may produce various forms of strip-metal work, the bracket is, as a rule, the most profitable to handle. The plain bracket is shown in Fig. 3, and is made by bending the strip at the proper angle on form A, after which the brace is adjusted by means of rivets. A rivet hole boring tool will be needed. A small metal turning or drilling lathe can be purchased for a few dollars and operated by hand for the boring, or a common hand drill can be used. Sometimes the bracket is improved in design by adding a few curves to the end pieces of the brace, making the effect as shown in Fig. 4. After these brackets are made they are coated with asphaltum or Japan; or the brackets may be painted or stained any desired shade.

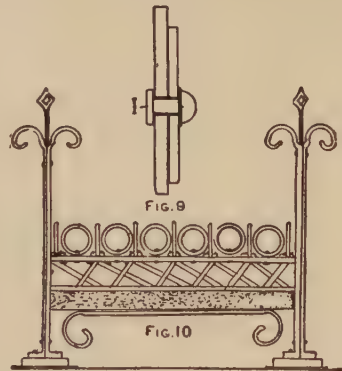
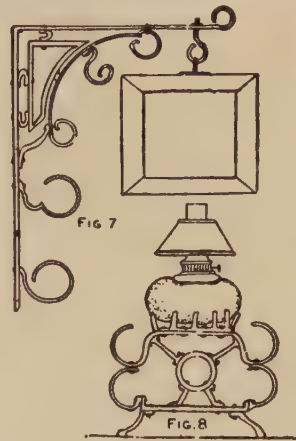
In some of the work required, it is necessary to shape a complete loop or circle at the end of the piece. This may

be wrought out as in Fig. 5. The use of a bar of iron or steel is as shown. The bar is usually about 2 in. in diameter and several feet in length, so that it will rest firmly on a base of wood or stone. Then the bending is effected as at F, about the bar E, by repeated blows with the hammer. After a little practice, it is possible to describe almost any kind of a circle with the tools. The bar can be bought at an iron dealers for about 40 cents. From the junk pile of junk shop one may get a like bar for a few cents.

A convenient form for shaping strip-metal into pieces required for brackets, fences, gates, arches, and general trimmings is illustrated at Fig. 6. First there ought to be a base block, G, of hard wood, say about 2 ft. square. With a round point or gouging chisel work out the groove to the size of the bar, forming a seat, by sinking the bar, H, one-half its depth into the wood as shown. In order to retain the bar securely in position in the groove, there should be two caps fitted over it and set-screwed to the wooden base. These caps may be found in junk dealers' heaps, having been cast off from 2-in. shaft boxes. Or if caps are not available, the caps can be constructed from sheet metal by bending to the form of the bar, allowing side portions or lips for boring, so that the caps can be set-screwed to the wood. Thus we get a tool which can be used on the bench for the purpose of effecting series of bends in strips of metal.

Since the introduction of the laws requiring that signs of certain size and projection be removed from public thoroughfares in cities, there has been quite a call for short sign brackets, so termed, of the order exhibited in Fig. 7. These sign-supporting brackets do not extend more than 3 ft. out from the building. A boy can take orders for these signs in almost any city or large town with a little canvassing. The sign supporting bracket shown is merely a suggestion. Other designs may be wrought out in endless variety. A hook or eye is needed to sustain the ring in the sign.

The young man who undertakes to construct any sort of bracket, supports, frames or the like, will find that he will get many orders for lamp-supporting contrivances, such as shown at Fig. 8. It is hardly necessary to go into details

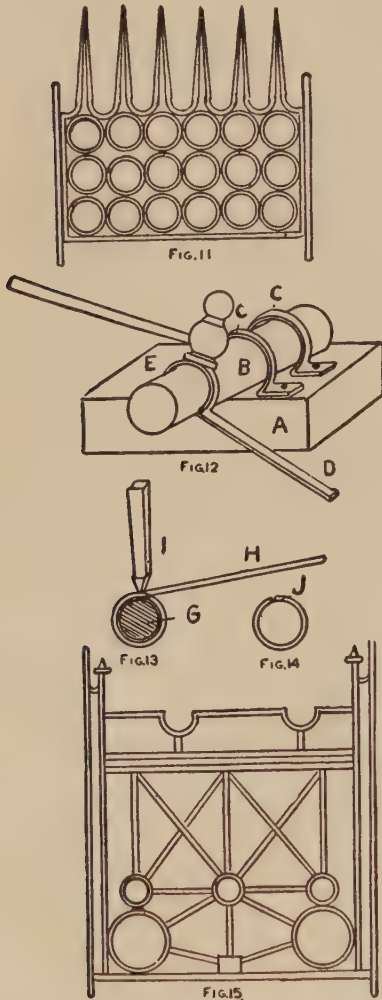


for making these stands, as every part is bent as described in connection with the bending forms, and the portions are simply riveted at the different junctures. Both iron and copper rivets are used as at I, in Fig. 9, a cross sectional view.

The best way is to bore straight through both pieces and insert the rivet. In some cases the rivet is headed up in the bore and again washers are used and the heading effected on the washer. Copper rivets are soft and easily handled, but are costly as compared with iron rivets.

Good prices are obtained for the guards for open fireplaces made in many varieties in these days. The re-

turn of the open fireplace in modern houses has created a demand for these guards and in Fig. 10 we show a design for one of them. The posts are made



sufficiently stiff by uniting two sides with rivets. The ends at top are looped as shown, while the ends or butts at the base are opened out to make the feet. Rings are shaped on forms and are then riveted to the base cross-piece as illustrated. Crosses are made to describe to central design and the plan is worked out quite readily with the different shapes.

The making of metal fire grate fronts has proven to be a very interesting and profitable occupation for boys in recent

times. Not long ago it was sufficient for the ingenious youth to turn out juvenile windmills, toy houses and various little knickknacks for amusement. The modern lad wants more than this. He desires to turn some of his product into cash. Therefore we present some of the patterns of fire grates which boys have made and can make again from scrap iron, with few tools and devices, and find a ready market for the same as soon as they are made. Figure 11 is a sketch of a form of fire grate bar or front that is constructed with a series of circles of strip metal. The best way is to go to the hardware store or iron dealer's and buy a quantity of $\frac{1}{4}$ -in., $\frac{1}{2}$ -in., and $\frac{3}{4}$ -in. iron, about $\frac{1}{8}$ to $\frac{3}{16}$ -in. thick. In fact $\frac{1}{16}$ -in. metal would do in many cases where the parts are worked out small in size. The $\frac{1}{8}$ -in. metal is very strong. Then after getting the supply of strip metal in stock, procure the usual type of metal worker's hammer, a cheap anvil, a 9-lb. vise, a cold chisel, a file or two, and a round piece of shaft iron, about 3 in. diameter and 2 to 3 ft. long. This piece of iron is represented at B, Fig. 12.

The iron is held in position by means of the straps of metal C, C, which are bent over the shaft tightly and grip the board base with set or lag screws as shown. The wooden base should be about 2 in. thick and large enough to make a good support for the iron shaft. The process of bending the rings in this way is as shown. The piece of strip iron is grasped at D. Then with the hammer the iron is gradually worked cold about the mandrel as at E until the perfect form is acquired. After the form is finished, the strip at the terminus of the ring is cut off. In order to get a steady base the wooden part may be bolted to a bench. In Fig. 13 is shown the method of clipping off the completed ring. The cold chisel is held upright, and by delivering several blows with the hammer upon the same, the point is caused to chip through the metal and release the ring. The shaft or mandrel is marked G. The cold chisel is indicated at I and the position

where the hand grasps the strip is at H. The final operation in shaping the ring is by driving the protruding cut, lip down, to the common level of the opposite point, thus giving us the finished ring with the lips closed on the mandrel as at J, Fig. 14. These rings can be turned out in this way very speedily. The next operation involves the process of uniting the rings in the plan to shape the design. The design work is often worked out ahead and followed. Some become so proficient that they can develop a design as they proceed.

Figure 11 is a design of grate front used for various purposes in connection with grate fires. The series of rings are united by a rivet between each at the joining point. With thin metal the holes can be punched with an iron punch and hammer on an anvil where there is a hole to receive the point of the punch after the punch penetrates the metal. For the heavier forms of metal a drill is necessary. A metal drill and brace can be purchased very cheaply for this work. After drilling the holes, the parts are erected and the rivets inserted and headed up as each addition is made. Thus the series of rings are united and then the side pieces are similarly riveted. The points at the top are then worked out and joined on. These points are filed down to the necessary taper after the union is effected. The finishing work involves smoothing rough places with a file and painting. Asphaltum makes a good black finish. Some of the best designs of grates are bronzed. Some are silvered. The different designs are finished as desired by customers.

Figure 15 is another design of grate in which the process of shaping the rings is like that in the first design. There are some half circles in this pattern and these are framed by shaping the same about the mandrel with the hammer. In order to get the shoulders close and the circle complete it is necessary to heat the metal. A coke fire can be made in a hole in the ground. Then procure a tin blowpipe and blow the flame against the metal at the point to be bent. This metal will become red

hot very soon, and can be bent readily against the anvil and the circular form. Let the metal cool off on the ground after heating. Fig. 16 is another design

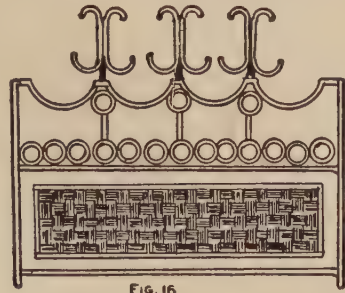


FIG. 16

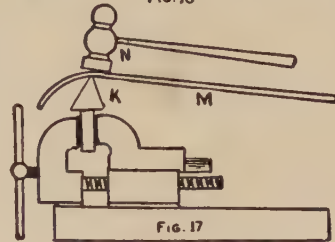


FIG. 17

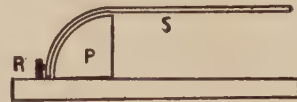


FIG. 18



FIG. 19

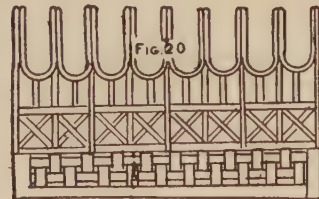


FIG. 20

which can be wrought out. The middle adjustment is wire screen work which may be bought at a hardware store and set into the position shown. Fig. 17 shows a chipping off device useful in connection with this work. Metal chippers can be bought at any tool store. The chipper is placed in the jaws of the vise as at K, and secured there. The strip of metal in process of cutting is marked M. The hammer head is caused to strike the metal just over the cutting edge of the chipper. The quick,

hard blow causes the cutting edge to penetrate far enough to sever the piece. Bending cold with a wooden form is done as in Fig. 18. The wooden form is marked P and is about 8 in. wide and 7 in. high, forming a one-sided oval shape. There is a pin R set into the base board of the oval form and the strip of metal for bending is grasped at S and the other end is inserted back of the pin R. By applying pressure, the strip of metal is bent to the form.

Figure 19 shows the hour-glass wood bending form, made by selecting a piece of hard wood block, about 6 in. square and boring through with an inch

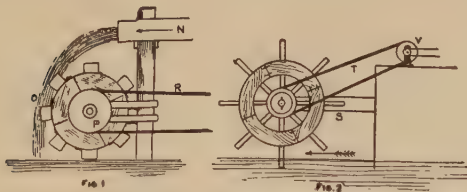
bit. Then the hole is shaped hour-glass like. The view is a sectional one. The block is placed in a vise and the strip for bending is inserted as at T.

The strip of metal is grasped at W and can be bent to various forms by exerting pressure. Fig. 20 is another type of fireplace front, constructed by uniting the shaped metal pieces. In fact an almost endless variety of designs can be wrought out after the start is once made. A good way to figure the price on the grate is to add up the costs of the parts and charge about 12 cents per hour for the work.

How to Make a Water Wheel

Considerable power can be developed with an overshot water wheel erected as in Fig. 1. This wheel is made with blocks of wood cut out in sections as indicated by the lines, so as to form the circle properly. The wheel can be

wood and extend outward as shown. The wheel is supported in a bearing on the piece S. A belt, T, communicates the power to the wheel V and from here the power is carried to any desired point.



Overshot and Undershot Wheels

about 24 in. in diameter to produce results and about 10 in. wide. Get some tin cans and attach them around the wheel as shown. Bore the wheel center out and put on the grooved wood wheel, P, and a rope for driving, R. This rope runs to a wooden frame in the manner illustrated. The water is carried in a sluice affair, N, to the fall, O, where the water dippers are struck by the volume and from 2 to 4 hp. will be produced with this size of wheel if there is sufficient flow of water. This power can be used for running two or three sewing machines, fans, fret-saws, and the like. Another form of water wheel is shown in Fig. 2. This is driven by an underflow of current. This type of wheel can be made on lines similar to the other, only that the paddles are of

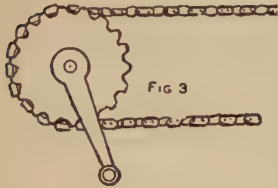
How To Build An Imitation Street Car Line

An imitation street car line may sound like a big undertaking, but, in fact, it is one of the easiest things a boy can construct, does not take much time and the expense is not great. A boy who lives on a farm can find many fine places to run such a line, and one in town can have a line between the house and the barn, if they are some distance apart.

Often all the boards and blocks required can be had for helping a carpenter clear away the rubbish around a new building. Wheels and parts of old bicycles, which can be used in so many ways, can be found at a junk shop at very low prices, wheels in good repair are not expensive. For the car for the street car line try to find a set of wheels having axles, but if you cannot find such, make shafts of hard wood, about 3 in. by 2½ in. and by means of a jack-knife turn, or shave down the ends to receive the hub bearings of the wheels. Fasten the wheel hubs securely over

the ends of the wood with pins or little bolts, or if the wheel bearing is of such a nature that it revolves on its own journal, the journal can be fastened to the end of the wood piece. Each of the wheels should be provided with a sprocket; any chain sprocket of a bicycle may be used. Fasten these sprockets on the outside of the wheels as shown in Fig. 1. They can be set on over the bearing end and secured with a set screw, or the original key can be employed. It is best in cases like this to use the original parts. Make the floor of the car of pieces of boards placed on the axles and nailed, screwed or bolted, as shown at A.

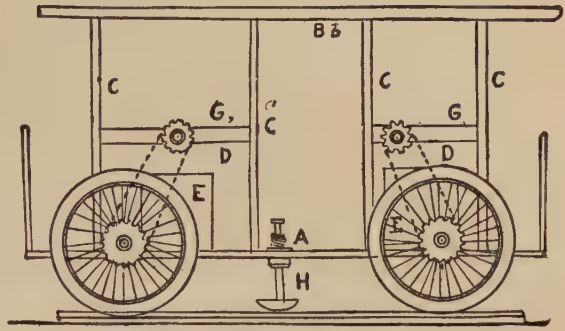
To erect the frame, place uprights, C C C C, in position as shown, fastening the ends to the base-boards, and making the roof line as at B, then put in the cross-pieces, G G. Seats, E E, are simply boxes. The drive of the car is effected by using the driving sprockets, D D, fitted to the crosspieces, G G, with the original bearings. The parts are thereby secured to the car and the chain placed on.



Key the cranks for turning to the upper sprocket's shaft and all is ready. If there are sprocket gears and cranks on either side, four boys may propel the car at one time. Considerable speed can be made on smooth roads, but it is the best amusement to run a car line on wooden tracks with a brake consisting of a piece of wooden shaft, passing through a bore in the car floor, and fitted with a leather covered pad as at H. A spiral spring holds up the brake until pressure is applied by foot power, when the brake contacts with the wooden track and checks the car.

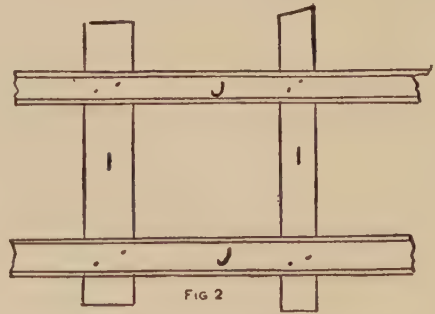
The track plan is illustrated in Fig. 2. Get some boards and place them end for end on other pieces set as ties. The main boards or tracks, J J, can be about

6 in. wide, to the edges of which nail strips about $\frac{3}{4}$ in. wide and about the



Construction of Car

same height. The ties, I I, can be almost any box boards. Wire nails are the best to use in putting the tracks together. The sprocket connection with the chain is shown in Fig. 3. This consists of the sprocket gear on the propelling shaft, and the crank. The pedals may be removed and a chisel handle, or any tool handle, substituted, so as to afford means for turning the



Section of the Track

crank by hand power. Great fun can be had with the road, and, furthermore, it can be made remunerative, as boys and girls can be given rides for a penny each.

Apply a coat of raw starch water to a dirty wall before painting; this, when dry, may be brushed or wiped off.

A good varnish for electric terminals is made of sealing wax dissolved in gasoline. To prevent brittleness add a little linseed oil.

Make a Hammered-Copper Plaque

By E. R. HAAN

IF you are artistically inclined and would like to do some work in hammered copper with figures in bold relief, as illustrated in this article, go to a hardware store and get a few ordinary nail sets, at a cost of 10 cents each, an 8-oz. and 13-oz. ball-peen hammer and some pieces of No. 18 gauge sheet copper, having these pieces cut to the size of the plaques. Be sure that the surface of the copper is not scratched or marred as this will ruin the work.

First get a picture or design from a newspaper or magazine, or, if you can draw satisfactorily, make it your-

do this, as shown in Fig. 1, while a short piece of dowel rod will allow you to get into recesses of the background, as shown in Fig. 2. The piece of copper will be dis-

torted considerably, but the design will stand up roughly in relief. Lay the plaque, face up, on a double thickness of corrugated cardboard obtained from an old box, and you will be able to improve the rough outline with the dowel punch and hammer, as



Hammered-Copper Work Is an Interesting Hobby and Copper Plaques in Bold Relief Appeal to Those Who Are Artistically Inclined

self. Trace the design on the surface of the copper by using typists' carbon paper. Go over the weak carbon lines with a soft lead pencil to bring them out clearly. Hold the lower jaw of a wood clamp in a bench vise securely, and bring the upper jaw of the clamp down over the design, to protect it while the background is being forced down about $\frac{1}{4}$ in. from the edge of the design. In doing this, the work has to be shifted a number of times in the clamp, and care must be taken to strike only the background at this stage of the job. A wooden punch and a hammer are used to

shown in Fig. 3. The reverse side of the plaque is shown in Fig. 4.

The next step is one of the most important in the whole process—that of annealing the copper. By pounding and stretching the plaque, the copper becomes very hard and brittle, which makes it extremely difficult to work, and if the work is continued while the copper is hard, it may be cracked. To overcome this, the plaque is heated to a cherry red and immersed in water. This makes it so soft again that it can readily be bent and hammered. The heating can be done by holding the plaque

over a gas flame, over a coal fire, or by applying the flame of a blowtorch, as shown in Fig. 7.

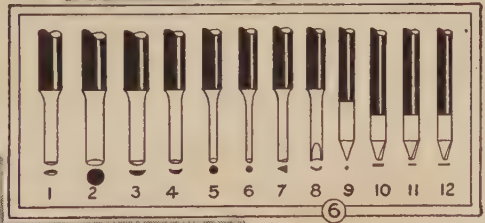
Laying the plaque, face down, on a double thickness of corrugated cardboard, shape the design by using wooden punches and a hammer, the faces of the punches being slightly rounded to prevent sharp dents in the design, where these are not wanted. Now use the ball-peen hammer on the background, as shown in Fig. 5. This hammering is done on an anvil or heavy piece of steel and, after the background is hammered, the plaque is again annealed. The nail sets are ground down, as shown in Fig. 6, and the ends are polished to remove the grinding scratches; if this is not done they will show up on the copper. Take punch No. 5 and, starting about $\frac{1}{8}$ in. from the design, punch the background down, until you have come to the very edge of the design, as shown in Fig. 8. Here it is necessary to be careful, as the design can easily be spoiled by a few misdirected

a straight line, about $\frac{1}{4}$ in. long. Give the finishing touches to the shape of the design from the reverse side of the plaque on corrugated cardboard as before.

Get 15 cents' worth of liver of sulphur from the drug store and crush the pieces to powder form, dilute them in water, and apply this solution to the background with a brush, as shown in Fig. 9. The copper will turn black where the solution touches it, so be careful not to get it on the design. Get some fine jewelers' polishing cloth and proceed to polish the figure. If available, use a buffing wheel for a finishing polish, and also buff the black coloring from the high spots of the background. Then apply transparent lacquer.



This Work Can Be Done at Home with a Ball-Peen Hammer, Woodworkers' Clamp, Vise and a Number of Nail Punches Ground to Suit the Work



blows. Anneal again and proceed to straighten out the plaque by bending it by hand and also by striking it on the background. A $\frac{1}{4}$ -in. border can be made along the edge of the plaque with punch No. 12, which produces



Newspaper Container

Newspapers are often thrown on porches regardless of the weather. A good container which will prevent them



from being blown away, or from being soaked, is shown in the drawing. It is simply a 1-ft. length of conductor pipe, closed at one end and fastened to the wall horizontally by means of sheet-metal straps. It is painted white and it is an easy matter for the carrier to roll up the newspaper and slip it into the container.

Assembling Battery Sets

Users of dry-battery sets for ignition on boats, gas engines, etc., commonly prefer sets contained in a metal or heavy cardboard case because they are compact and waterproof. They cost more, of course, than separate cells, but it is not necessary to discard the whole battery because one or more units are exhausted. Remove the waterproof compound, replace the dead cells by new ones, remelt the compound and pour it back into place. The owner of a fleet of pleasure boats uses this method entirely, with the result that the original battery cases last indefinitely.

Removing Sugar Stains from Clothes

Sugar spots on silk or crepe dresses are difficult for the home cleaner to remove as gasoline will not dissolve them and water leaves rings or destroys the color. To

avoid these difficulties, cut down the bristles of a discarded toothbrush to approximately half their normal length. Stretch the spotted portion of the garment over the ironing board and brush across the grain of the fabric. The brushing will loosen and remove the sugar, if this is perfectly dry, and will also raise the nap so that the spot cannot be detected. Even though some of the sugar may remain in the fabric, it will not become apparent again until the garment is dampened and pressed the next time.

Watering Honey Bees

Honey bees require much water during the hot summer months. They will fly miles for a drink, but setting out of vessels filled with water near the apiary is not quite satisfactory, as many bees will drown in them. This danger is entirely eliminated by providing the novel drinking fountain shown in the photo. A small keg is filled with water and provided with a brass stopcock. This is opened so that the water will only drip on a board and keep it moist. Of course, an air hole is drilled in the bung. The bees collect in numbers, drinking up the water without any danger of drowning. A 5-gal. keg



Drinking Fountain Which Waters Bees without Any Danger of Drowning Them

needs refilling only twice a week and will supply water for 50 hives.

Repairing Box Cameras

In repairing the inner part of box cameras which have been broken loose, use a binding of strong black cloth well glued in place. This will materially strengthen the joints where the wooden pieces are so thin that it is impossible to use brads in holding them together.

Do not forget to thoroughly clean all the old glue or cement from the joints with a rasp or sandpaper before attempting a repair.

A Fishhook Box

A box that may be used to hold fish-hooks, sinkers, matches or any small articles, can be made from two empty shot-gun cartridges as shown in the sketch. The paper is cut from the brass part of one shell at the place marked A, Fig. 1, and the brass part, Fig. 2, is used for a cap on the other

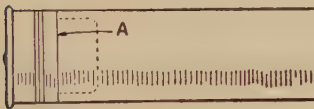


FIG. 1



FIG. 2



FIG. 3

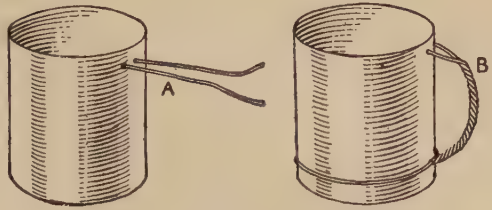
Made of Shotgun Shells

shell (Fig. 3). Coating the box with shellac will improve its appearance.—Contributed by Abner B. Shaw, N. Dartmouth, Mass.

A Tin Drinking Cup for the Camp

If in need of a drinking cup while camping, a temporary cup can be made of a tomato or baking-powder can. Punch two holes near the top of the can; bend a piece of wire and place the ends through the holes as shown at A in the sketch. Pull the ends to draw the loop close up on the inside of the tin and then twist the ends to form a handle as shown at B. When there

is enough wire twisted to form a good handle, pass the ends around the can



Handle on a Tin Can

at the bottom and twist them together on the opposite side.—Contributed by W. A. Lane, El Paso, Tex.

A Bookmark

A very handy bookmark can be made by attaching a narrow ribbon to an ordinary paper clip and using it as shown in the sketch. The clip is slipped over the binding in the back of the book as shown in the sketch.—Contributed by Chester E. Warner, Kalamazoo, Mich.



Kitchen Knife Sharpener

A good serviceable knife sharpener may be made from a piece of steel cut as shown with two screw holes drilled for fastening it to a piece of wood or to a table. The knife is drawn through and sharpened on either side. Both positions of the knife are shown. The

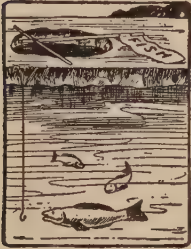


Sharpener on Table Edge

steel is hardened before fastening it in place.—Contributed by George Madson, Chicago, Ill.

Devices of Winter Sports—How to Make and Use Them

In the north the red-cheeked boy digs a hole in the ice and while he amuses and invigorates himself at skating, the fish underneath the icy sheet



"Tip-Up Pole"

fasten themselves to the hook he has let down through a hole. The boy used to sit over the hole in the ice and wait for the fish to bite, but that became too slow and detracted too much from his pleasure at skating. So his inventive genius set it-
self to work and the "tip-up" and "signal" shown in the illustration was the result. When the fish is not biting the flag lies flat on the ice, but as soon as a fish has swallowed the hook the flag pole stands straight up wafting its bright colored flag to the breezes and all the boys on the skating pond read the word "fish." The fish is drawn up, the hook rebaited and the youthful fisherman resumes his pleasures on the ice. Often a score or more of these "tip-ups" are planted about the edges of the ice pond, each boy bringing his fishing tackle with his skates and thus finding a double source of amusement. Maybe one boy will thus have a half dozen different lines in the water at once, it being easy to watch them all together.



"Tip-Up" Fish Caught

The device by which the fish is made to give its own signal when caught is exceedingly simple and any boy can make it. Procure a light rod about 2 ft. in length and to one end fasten a small flag, made of any bright colored cloth.

Bind the rod at right angles to another stick which is placed across the hole, so that a short piece of the flagrod projects over the cross stick. To this short end fasten the fishing line. Be sure and

use strong string in binding the two rods together, and also take care that the cross stick is long enough to permit several inches of each end to rest on the ice. After fastening the line to the short end of the rod, bait the hook with a live minnow or other suitable bait and let it down through the hole. When the fish is hooked the flag will instantly raise and wave about strenuously until the fish is taken from the water.

"Jumping-Jack" Fisherman

If the small boy has a "jumping-jack" left over from Christmas, he may make this do his fishing for him



Jumping-Jack Fisherman

and serve as well as the "tip-up," or he can easily make the jumping-jack himself independent of Santa Claus. The string which is pulled to make the joints move is tied securely to the fishing line; the hook is baited and lowered into the water through a hole in the ice. The "jumping-jack" waves his legs and arms frantically to notify the boys when the fish is biting. The "jumping-jack" is also used for fishing in summer time by placing it on a float which is cast into the water.

Merry-Go-Round Whirl on Ice

A German device for the amusement of children is a whirl on an ice merry-go-round. It is made by placing a vertical shaft or stake, provided with a couple of old cart-wheels, in a hole in the ice. One wheel acts as a turning base and prevents the shaft from sinking into the pond, and the other forms a support for the long sweep attached for propulsion purposes, and should be fastened to the shaft about 3 ft. above the base wheel. The sleds are made fast in a string to the long end of the sweep, which when turned rapidly

causes the sleds to slide over the ice in a circle at a high speed.

If the sweep is long enough to have each end from the shaft the same length, two strings of sleds may be attached, which will balance the device and make the turning much easier.

The Running Sleigh

Another winter sport, very popular in Sweden, and which has already reached America, is the "running sleigh," shown in the illustration. A light sleigh is equipped with long double runners and is propelled by foot power. The person using the sleigh stands with one foot upon a rest attached to one of the braces connecting the runners and propels the sleigh by pushing backward with the other foot. To steady the body an upright support is attached to the runners. The contrivance can be used upon hard frozen ground, thin ice and snow-covered surfaces, and under favorable conditions moves with remarkable speed. The "running sleigh" has a decided advantage over skis, because the two foot supports are braced so that they cannot come apart. Any boy can make the sleigh.

The Winged Skater

With the actual speed of the wind a skater may be hurled along the ice if he is aided by sails. He has been known to travel at the rate of 40 miles an hour,

of excitement, is not attended with danger. The sails are easily made, as the illustrations and description will show.

Secure two large thin hoops about 4 ft. in diameter. They may be obtained from an old hoghead or by bending thin strips. For each hoop select a piece of strong cane about $\frac{3}{4}$ in. in diameter to constitute the fore and main masts or cross-yards. Extend these across the center of the hoop and fasten each end firmly to the hoop's sides. For

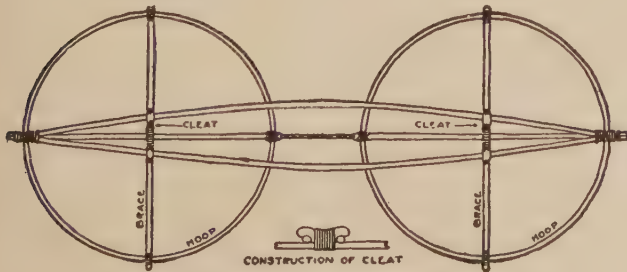


Running Sleigh

the middle of each cross-spar make a cleat and lash it on firmly. The main spar should also be made of two pieces of strong cane, each about $9\frac{1}{2}$ ft. long. Bind them together at each end so that the large end of one is fastened to the small end of the other.

Next comes the attaching of the sails to the separate masts. The sails should be made of strong sheeting or thin canvas. Tack the cloth to the hoop on the inner side after it has been wrapped around the hoop two or three times.

Now the main spar should be attached by springing it apart and slipping the cleats of the cross-spar between the two pieces. Bind the inner sides of the hoops tightly together by means of a very strong double cord, as

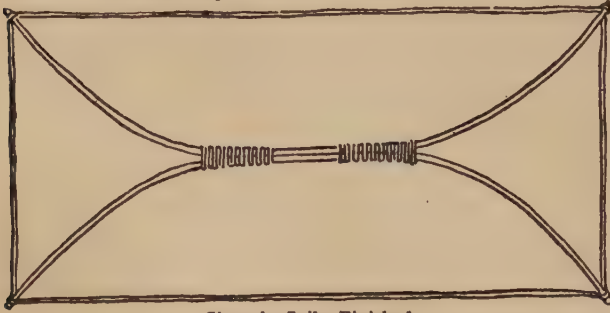


Frame for Skater's Sails

and the sport while affording the limit

shown in the figure. Then your sail

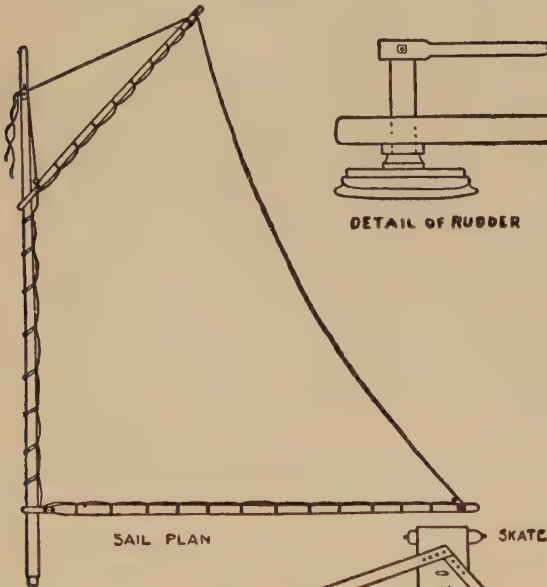
is ready for the ice pond. See that your main masts as herein described, making the sails square shaped instead of



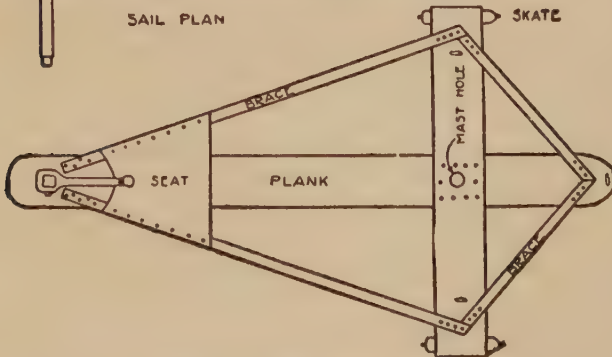
Skater's Sails Finished

sail and you will skim along the ice as lightly as a bird on the wing. With a little practice you will learn to tack and guide yourself as desired.

main masts as herein described, making the sails square shaped instead of round and leaving off the hoops. In this case the sails should be securely bound with strong tape. Attach a corner to each end of the cross-spar, and a corner to the outer end of the main spar. The remaining corner of each then appears opposite to each other, and should be fastened together by strong cord in the same manner as the hoops. In this case the sails may be left off until after the frame is entirely put together and then fastened on to the spars by buttons.



DETAIL OF RUDDER



Plan of Ice Boat, Sail and Rudder

If the hoops cannot be easily obtained the sails may be made equally effective by using the main spar and fore and

board should be 4 or 5 ft. long, 6 in. wide and 2 in. thick. The cross board may be of a piece of 1 by 6-in. plank 3 ft.

A more simple sail may be made according to the plans illustrated in the lower drawing. It is made by binding together in the center the halves of two strong hogshead hoops, or two bent poles are better. If possible the sail should be about 8 ft. long and 4 ft. wide. Fasten on the sail at the four corners. The rig will convey two persons and is more easily constructed than any other.

Ice Boating

But the sport that is greatest of all, the one that used to be part of the life of every northern boy, and which is being revived in popularity after years of stagnation, is ice boating. With the aid of old skates, pieces of board and an old sheet or a small bit of canvas, any boy possessed of ordinary mechanical genius may make an ice boat. The frame of the boat should be made something in the form of a kite. The center-

long. Fasten these with braces of small stout strip, as shown in the drawing, and screw the cross-piece securely to the center-board. Bore a hole in the center of the intersection for the mast pole. The seat may be made of a piece of strong cloth or leather. Three skates are fastened on to either side of the cross-board and one to the rear end of the center-board, the latter of which is to operate as a rudder. In attaching the skates first make a couple of runner blocks, each 6 in. long and 3 in. wide. Bore holes in them for the



Boy's Ice Boat

straps of the skates to pass through and fasten them securely. Nail the runner blocks firmly to the cross-board about $1\frac{1}{2}$ in. from

each end.

In making the rudder hew down a piece of scantling 1 ft. long until it assumes the shape of a club with a flat base. Nail a strip of wood firmly to this base, and to the strip fasten the skate. Run the top of the club through a hole bored in the stern of the center-board. Then make the helm by boring a hole in one end of a strip of soft board about 1 ft. long, and through this hole pass the club or rubber-pole and fasten it so it may be shifted when desired. Make the sail out of an old sheet, if it be strong enough, piece of canvas, or any such substance and attach it to the mast and sprit as shown in the illustration, and guide it by a stout string attached to the lower outer corner. As



Fig. 1—Barrel Stave Sled

an ice boat will travel faster than the wind, some care and considerable skill is necessary. Unless you are accustomed to managing a sail boat, do not

select a place in which to learn where there are air holes or open water. To stop the boat throw the head around into the wind, same as you would with a sail boat. If the wind is strong the

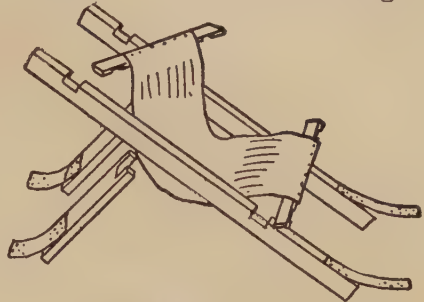


Fig. 3—Folding Chair Sleigh—Top Parts Disconnected

occupants of the boat should lie flat on their stomach.

Coasters and Chair Sleighs

Make your own sled, boys! There is no use in buying them, because your hand-made sled is probably better than any purchased one and then you can take so much more pride in it when you know it is of your own construction. There are so many different designs of sleds that can be made by hand that the matter can be left almost entirely to your own ingenuity. You can make one like the bought sleds and face the runners with pieces of an iron hoop which will answer every purpose. A



Chair Sleigh



Fig. 2—Folding Chair Sleigh Bottom

good sled for coasting consists simply of two barrel staves and three pieces of board as shown in the picture, Fig. 1. No bought sled will equal it for coasting and it is also just the thing for carrying loads of snow for building snow houses. The method of its construction is so simple that no other description is needed than the picture. You

can make a chair-sleigh out of this by fitting a chair on the cross board instead of the long top board or it will be still stronger if the top board is allowed to remain, and then you will have a device that can readily again be transformed

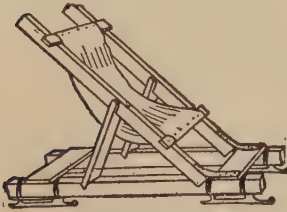


Fig. 4—Folding Chair Sleigh Open

into a coasting sled. In making the chair-sleigh it is necessary, in order to hold the chair in place, to nail four L-shaped blocks on the cross boards, one for each leg of the chair. Skating along over the ice and pushing the chair in front of him the proud possessor of a chair-sleigh may take his mother, grown sister or lady friend with him on his outings, and permit her to ride in the chair.

Folding Chair Sleigh

A folding chair sleigh is even more enjoyable and convenient than the device just described. If the ice pond is far from home this may be placed under your arm and carried where you like.

The illustrations, Figs. 2 and 3, show all the parts as they should look before



Fig. 5—Folding Chair Sleigh Closed

being joined together. The seat may be made of a piece of canvas or carpet. The hinges are of leather. Figure 4 shows the folding chair sleigh after it has been put together. Skates are employed for the runners. The skates may be strapped on or taken off whenever desired. When the chair is lifted the supports slip from the notches on the side bars and fall on the runner bars. The chair is then folded up so that it can be carried by a small boy. With regular metal hinges and light timbers a very handsome chair can be constructed that will also afford an ornamental lawn chair for summer.

The Toboggan Sled

When the snow is very deep a toboggan sled is the thing for real sport. The runners of the ordinary sled break through the crust of the deep snow, blocking the progress, and spoiling the fun. The toboggan sled, with its broad, smooth bottom, glides along over the soft surface with perfect ease.

To make the toboggan sled, secure two boards each 10 ft. long and 1 ft. wide and so thin that they can be easily bent. Place the boards beside each other and join them together with cross sticks. Screw the boards to the cross stick from the bottom and be sure that the heads of the screws are buried deep enough in the wood to not protrude, so

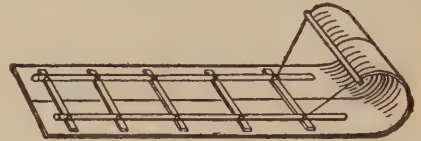


Fig. 6

Fig. 6—The Toboggan.

that the bottom will present an absolutely smooth surface to the snow. Fasten two side bars to the top of the cross sticks and screw them firmly. In some instances the timbers are fastened together by strings, a groove being cut in the bottom of the boards so as to keep the strings from protruding and being ground to pieces. After the side bars are securely fastened, bend the ends of the boards over and tie them to the ends of the front cross bar to hold them in position. See Fig. 6. The strings for keeping the boards bent must be very strong. Pieces of stout wire, or a slender steel rod, are even better. The toboggan slide is the favored device of sport among the boys in Canada, where nearly every boy knows how to make them.

The Norwegian Ski.

You have often read of the ski, the snowshoe used by the Norwegians and other people living in the far north. With them the men and women glide down the snow-covered mountain sides, leap across ditches, run races and have all kinds of sport. They are just

as amusing to the American boy who has ever learned to manipulate them, and it is wonderful how much skill can be attained in their use. Any boy with a little mechanical ingenuity can make a pair of skis (pronounced skees). They can be made from two barrel staves. Select staves of straight grained wood. Sharpen the ends of each and score each end by cutting grooves in the wood, as shown in the cut, Fig. 7. A pocket knife or small gouge will suffice for this work. Then smear the end of the staves with oil and hold them close to a hot fire until they can be bent so as to tip the toes upward, as shown in the picture, Fig. 7. Then with a cord bind the staves as they are bent and permit them to remain thus tied until they retain the curved form of their own accord. Now screw on top of each ski a little block, just broad and high enough to fit in front of the heels of your shoe. Fasten a strap in front of

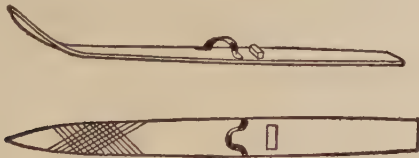


FIG. 7
Home-Made Skis

each block through which to slip your toes, and the skis are made. The inside of the shoe heel should press firmly against the block and the toe be held tightly under the strap. This will keep the skis on your feet. Now procure a stick with which to steer and hunt a snow bank. At first you will afford more amusement to onlookers than to yourself, for the skis have a way of trying to run in opposite directions, cross-wise and various ways, but with practice you will soon become expert in their manipulation.

Home-Made Settee

Many people have old wooden beds stored away which can easily be made into handy settees like the one shown in the accompanying photograph. A few nails and one-half dozen 3-in. screws are all the materials necessary

besides the old bed. The tools needed are a saw, hammer and a screwdriver. The head-board, if too high, can be cut



Settee Made from Old Wooden Bed

off and some of the ornaments replaced. The footboard must be cut in two to make the ends or arms of the settee. The side rails and a few of the slats are used in making the seat.—Contributed by Wm. F. Hild, Lake Forest, Ill.

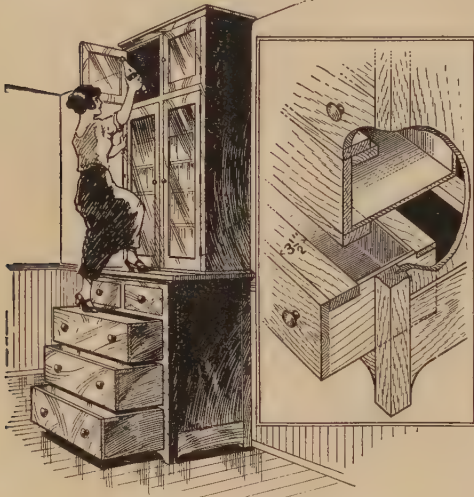
Enameling a Bicycle Frame

Make an enamel by mixing 2 oz. burnt umber with 1 qt. boiled oil, heating, and then adding 1 oz. asphaltum. Keep the mass hot until thoroughly mixed, says the Master Painter. Thin with turpentine while still hot.

Use a camel's hair brush for applying the enamel and allow it to set; then place the article in an oven, bake for six or eight hours at a temperature of 250 deg. F. When cool rub down with steel wool. Apply a finishing coat and allow it to bake eight hours at 250 deg. F. Rub down with a soft rag, varnish and bake again at 200 deg. F. Heat and cool the frame gradually each time. Black enamel is easiest to apply and bakes hardest, but requires a temperature of 300 deg. Colors can be baked at from 200 to 250 deg.

Steps Built on Drawers

Kitchen cupboards often extend to the ceiling and their highest shelves are good storage places but are hard to get at. Pulling out the drawers and standing on



A Permanent Stepladder for Reaching the High Shelves of a Kitchen Cabinet

the edges is both awkward and dangerous, but 3½-in. ledges provided just inside of the drawers, as shown in the illustration, make it safe to use them as a stepladder. The ledges extend across the entire width of the drawers, but are narrow so that articles kept in the latter are as easily reached or stowed away as before the change was made.—A. May Holaday, San Jose, Calif.

Preventing Choker-Wire Damage on Ford Radiator

It is usually necessary to choke the carburetor of a Ford car before starting the engine and the choker wire is almost invariably placed between the radiator tubes so that it can easily be grasped when one is cranking the engine. This wire will eventually wear a hole in the soft copper tubing and cause a bad leak, which is difficult to solder. An excellent way to prevent this is to solder a small metal pipe between the radiator tubes, so that it comes flush both in front and behind the radiator. The wire is passed through this pipe and thus can no longer rub against the radiator tubes. A small amount of lubricant may be placed in the pipe when giving the car a general greasing.—Bunyan Kennedy, McCool, Miss.

Protecting Auto Upholstery

While making repairs on closed cars, it often happens that the upholstery is soiled by the workman. To prevent this, seat covers of canvas or other heavy cloth will be found useful. The covers are made in pieces to fit over the whole upholstery, including the sides and doors, large safety pins being used to keep them in place. Car owners who do their own repair work will also find covers of this kind serviceable as a protection against grease and dirt.—G. A. Luers, Washington, D. C.

Simple Roller Coaster

A roller coaster of the kind shown in the drawing will be found to give additional pleasure to children who are fond of skating, especially if they live near a hill having a smooth side-walk on which they can coast. The coaster consists of a 1 by 4-in. board about 3 ft. long, with half of an ordinary roller skate bolted on it at one end as shown. A seat and handle are also bolted across the board, the seat consisting of a short length of 4-in. material and the handle of a length of broomstick. The method of using the device is apparent from the drawing.—Roscoe A. Johnson, Portland, Oreg.



Inexpensive Window Shades

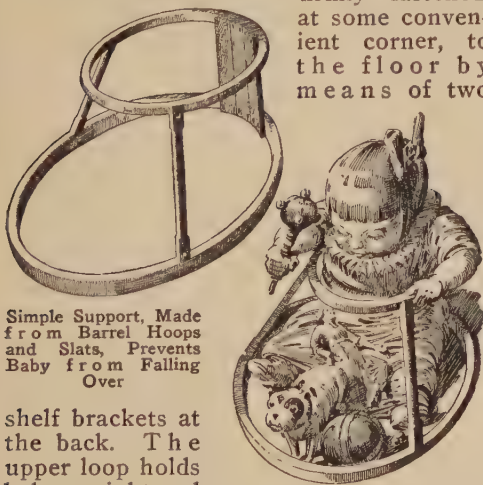
On several double windows in my house I used large opaque shades, about 72 in. wide, instead of a single shade for each window. These were soiled in a few months and were almost impossible to clean. As new ones were rather expensive, I decided to substitute cheaper material, light in color and washable. So I purchased 15 yd. of 72-in. bleached sheeting of good quality and cut this into five

3-yd. lengths. After hemming them at one end to receive the slats, I starched them and stretched them out to dry in the same way as lace curtains. I then ironed them smooth and tacked them to the rollers of the discarded opaque curtains. Shades made in this way are translucent, giving the rooms plenty of light. Every time the curtains are laundered I also launder the shades.

The opaque curtains previously used cost about \$32, while the total cost of these homemade curtains was only \$12.—Mrs. Minnie T. Miller, Wells, Nev.

Support for Baby

When babies are just able to sit on the floor and play with their toys, but not strong enough to keep from falling over, they are usually propped up with pillows. These are, however, rather warm and uncomfortable, and it is much better to provide a support of the kind shown in the illustration. It is made from two wooden barrel hoops, a couple of slats, 2 in. wide and about 14 in. long, and a few narrow boards, 10 in. long. One of the hoops is cut open, one-third of the length cut off, and the ends joined to form the smaller upper loop. The hoops are fastened to the boards that form the backrest, with small bolts, and the 14-in. slats similarly attached to the hoops to brace the "baby sitter." All bolt heads should be countersunk so that they will not hurt the baby or tear its dress. The assembly is then sandpapered smooth and varnished, and firmly fastened, at some convenient corner, to the floor by means of two

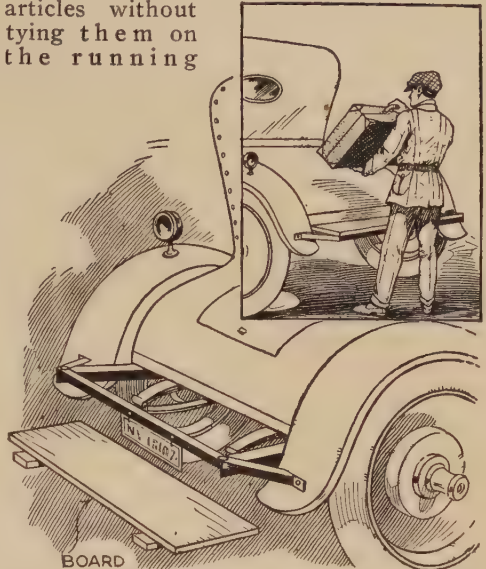


Simple Support, Made from Barrel Hoops and Slats, Prevents Baby from Falling Over

shelf brackets at the back. The upper loop holds baby upright and the lower loop gives plenty of room for its legs and playthings, which cannot roll out of its reach.—Minnie Britt Riggle, Bavaria, Kans.

Luggage Carrier for the Roadster

Farmers who own roadster automobiles find it difficult to carry egg cases, cream cans and other articles without tying them on the running



Homemade Luggage Carrier on Roadster Is Useful to Farmers and Salesmen

boards. This difficulty is overcome by providing a luggage carrier of the kind shown in the drawing, which is also convenient for salesmen. Two 30-in. lengths of 2-in. angle iron are securely bolted to the frame under the rear end of the car, with the ends projecting about 15 in. Across these ends is bolted a brace of 1-in. angle iron, long enough to be bent over to permit fastening the ends to the fenders with short bolts. A piece of 1-in. board, just long enough to fit on the frame thus made, is provided with cleats, and serves as a floor on which the luggage is carried. The carrier may be enameled to match the color of the car and will support a weight of 300 lb. safely.

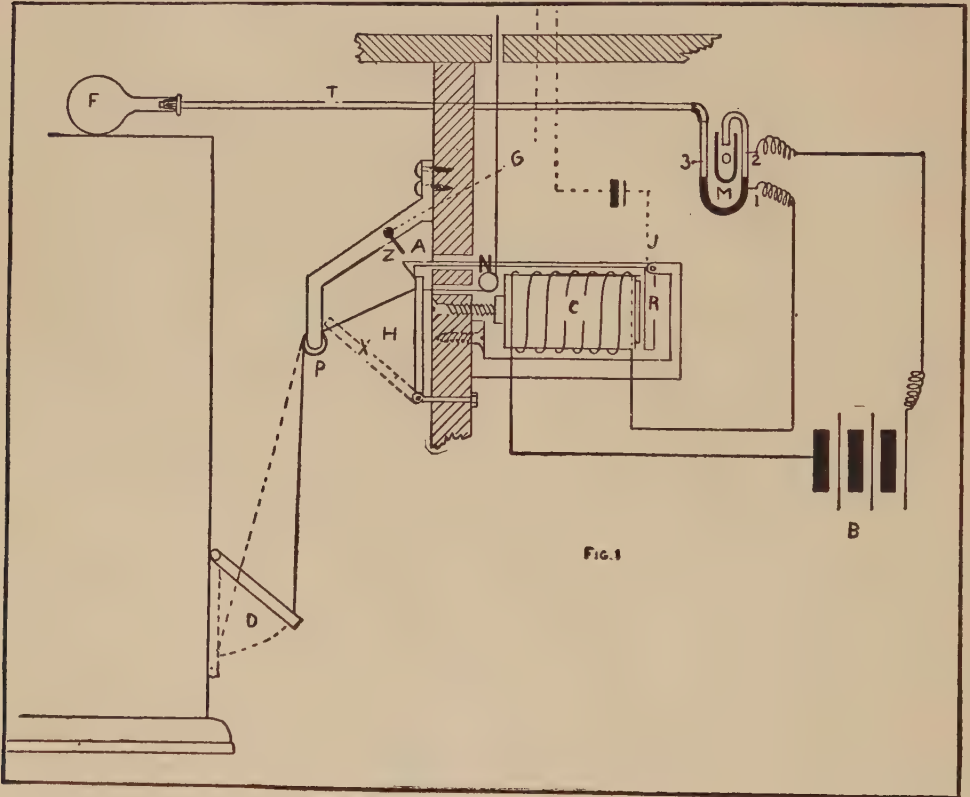
Shaving-Brush Holder

A shaving brush is injured by permitting it to remain in the mug to dry. It should be suspended with the hair down. A holder can readily be made from a piece of wire bent to form a forklike clamp, with the back-bent wire ends pointed. The clamp should fit the neck of the handle snugly, and the pointed ends are driven into the wall or other support. Or a loop may be made at each end of the wire so that the holder can be attached to the wall with two small screws.

How to Make an Electric Furnace Regulator

We have a furnace in our house and a part of my work each evening last winter was to go down in the basement at 9 o'clock, fill the furnace with coal for the night and stay there until it was burning in good shape, then to close the draft door. As this performance requires from twenty to thirty

of iron is hinged to I. To the other side of H another cord G is fastened, which passes over the pulley N and terminates in any convenient place in the rooms above. This piece of iron H is held in place by the release A. Now C is a coil of wire from a door bell. R is an armature which works A on pivot



Details of Furnace Regulator Construction

minutes I concluded to make a self-acting device which would close the draft and leave the furnace safe, without any further attention on my part, after putting in the coal and opening it up to burn. As some other boys may like to build the same regulator I will tell just how to make one and how it operates.

Referring to Fig. 1, you will see a straight cord is attached to the draft door of the furnace, D, and is run over the pulley P and finally is attached to a small piece of iron, H. This piece

J. M is a U-tube, filled with mercury, one end being connected to a half liter glass flask F by the tube T, and the other end terminates in an overflow tube O. B is a battery of three bi-chromate cells which are connected up with the C and the platinum points 1—2, which are fused into the U-tube.

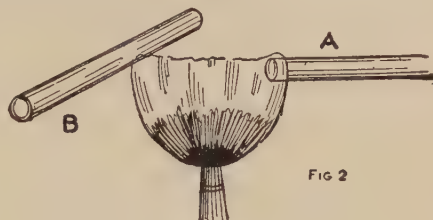
On fixing the furnace the iron piece H takes position X, this being the normal position when draft door D is closed. On arriving upstairs I pull the cord G, which causes the piece H to become fixed in the vertical position

by means of A. This opens the draft door at the same time. Now when the furnace heats up sufficiently it causes the air to expand in F, which causes the mercury in M to rise a little above the point 2. This immediately causes a current to flow through C which in turn draws R towards it, raises A and causes H to drop to position X. This shuts the furnace door. Now the furnace, of course, cools down, thus causing the air in F to contract and consequently opening the circuit through C. If at any time the furnace should overheat, the raising of A, on which is grounded a wire from a signal bell upstairs, will make a circuit through the bell by means of the point Z and wire leading therefrom. This bell also serves to tell me whether H has dropped or not. This same device of regulating the draft D can be used to regulate the damper, found on the coal doors of most furnaces, by simply fusing a platinum point on the other side of M and changing the cord which is attached to D. A two-contact switch could also be inserted to throw connections from 2 to 3. It would work in this manner: The damper door, of course, which keeps a low fire, would be up in a position similar to D; on the furnace cooling too much, connection, due to contracting of air in F, would be made through 3 and C, causing H to drop, thus closing door. This simple device worked very well all last winter and gave me no trouble whatever.

If you cannot readily procure a U-tube, you can make one, as I did, and the work is interesting.

The U-tube is constructed in the following manner. A glass tube is closed at one end. This is done by holding the tube in one corner of a gas flame, somewhat near the dark area (A, Fig. 2), and constantly turning the tube. when it will be found that the glass has melted together. Now, after it is cool, about 3 or 4 in. from the sealed end, the tube is held steadily so that the flame will heat one small portion (B, Fig. 2). After this small portion is

heated blow into the tube, not very hard, but just enough to cause tube to bulge out. Allow to cool. Then reheat the small bulged portion, blow quite hard, so that the glass will be blown out at this point, forming a small hole. Now insert about $\frac{1}{2}$ in. of platinum wire and reheat, holding platinum



Making the U-Tube

wire by means of a small pliers so that it will be partly in the tube and partly without. The platinum will stick to the glass, and if glass is sufficiently heated one will be able to pull it, by means of pliers, from one side of the hole to the other, thus sealing the wire into the tube. Another wire is sealed in the same way about 1 in. from the first. Now, to bend the tube, one must hold it, with both hands, in the flame and turn constantly until soft. Quickly withdraw from flame and bend, just as you would a piece of copper wire. Allow to cool slowly.

The several tubes are connected with a short piece of rubber tubing.

The total cost of materials for constructing the apparatus complete will not amount to more than one dollar.—Contributed by M. G. Kopf, Lewis Institute, Chicago.

Weatherproofing for Tents

Dissolve 4 oz. sulphate of zinc in 10 gal. water; add $\frac{1}{2}$ lb. sal-soda; stir well until dissolved, and add $\frac{1}{2}$ oz. tartaric acid. Put the tent cover in this solution and let lie 24 hrs. Take out (do not wring it) and hang up to dry.—Grinnell's Hand Book on Painting.

Sheet metal placed between two boards in the jaws of a vise and clamped tightly, can be sawed easily with a hacksaw.

Western Orchestra Successfully Uses Old Auto Brake Drums for Chimes



Orchestra Chimes from Auto Drums

Have you noticed, when relining the brake bands on the rear wheels of your car, the clear, silvery tone the brake drum produces when you accidentally strike it with the hammer? A western orchestra leader uses the drums for playing beautiful chime solos and a number of obbligato accompaniments. So excellent are the results obtained that the orchestra has adopted them as permanent parts. Here is a valuable suggestion for amateur orchestras, which cannot afford to purchase a set of manufactured chimes. The brake drums on different automobiles vary in size and hence in pitch and tone.—L. W. Pedrose, Seattle, Wash.

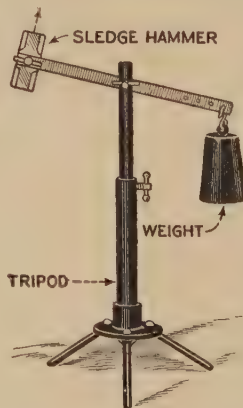
Determining Amount of Water in Storage Battery

The storage battery of an automobile is likely to be the most neglected part of the car for it is usually tucked away in the least accessible place and the car owner forgets to add water to keep it in good condition. It is easy to construct and install a dash signal that will tell at a glance when it is time to refill the battery. Drill a small hole in one of the rubber vent caps and force a short lead strip through this aperture, allowing it to project downward until it dips into the electrolyte and almost touches the top of the

separators. Remove the prepared vent cap and carefully fill any holes around the lead with hot sealing wax, being sure to leave one small pinhole through which gas may escape when the battery is charging. If your car has the negative terminal of the battery grounded to the frame, screw the cap with its lead electrode into the top of the cell nearest the positive end. Fasten with solder a length of well insulated copper wire to the exposed end of the electrode and extend it to a push button, mounted in any location convenient to the driver's hand, and then to a 6-volt 2-cp. lamp on the dash. As long as there is sufficient solution in the battery, this lamp will light when the button is pressed, but when the liquid drops too low the lamp will fail to respond. Some electric systems ground the positive wire, and this must be determined at the start, for, if your car is thus wired, it will be necessary to screw the prepared vent cap into the cover of the cell nearest the negative end.

"Dumb-Boy" Aids Riveting

Mechanics often need a helper to hold a heavy hammer under the surface of a plate which is being riveted. How-



ever, help is unnecessary if a "dumb-boy" of the kind shown in the drawing is used. It consists of a pivoted arm on a tripod, with a sledge hammer fastened to one end of the arm and a counterweight to the other. The hammer is adjustable and can be set at different angles and held there by means of a thumbscrew. Holes at the other end of the arm allow the counterweight to be hung at different points to vary the pressure of the hammer against the underside of the plate being riveted. Of course, the tripod is also made adjustable to various heights.

Kites of Many Kinds and How to Make Them

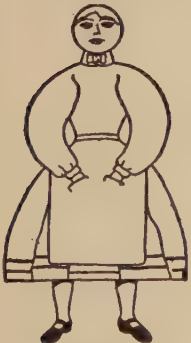
One of the prettiest of all is the butterfly kite. To make this get two thin kite sticks of equal length. Bend each in an arc, tying one end of a strong string to one end of each stick and



Boy Kite

the other end of the string to a point about 3 in. from the other end of the stick. This leaves one end of each stick free, hooking over the hemisphere described by the thread and the stick. Now tie another thread to

each of these free ends and tie the other end of the thread to a point near the other end of the stick, corresponding with the distance from the end at which the first strings were tied on the opposite side. This done, you should have two arched frames, each an exact counterpart of the other in size, curvature and weight. Now fasten the two frames together so that the arcs will overlap each other as shown in the sketch. Bind the intersecting points securely with thread. To make the butterfly's head, secure two heavy broom straws or two short wires, and



Girl Kite

attach them to the top part of the wing frames near where the sticks intersect, so that the straws or wires will cross. These form the antennae, or the "smellers." Then select the color of paper you want, yellow, brown, blue, white or any other color; lay it on a flat surface and place the frame on top of it, holding the

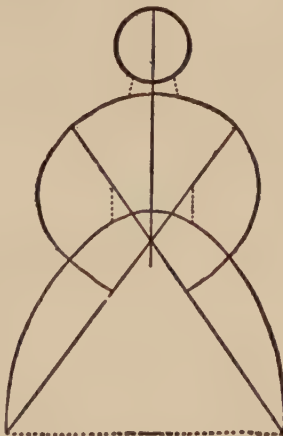
frame down securely with a weight. Then with a pair of scissors cut the paper around the frame, leaving about a 1/2-in. margin for pasting. Cut slits in the paper about 2 in. apart around the curves and at all angles to keep the paper from wrinkling when it is pasted.

Distribute the paste with a small brush and make the overlaps a little more than 1/4 in. wide and press them to-



Butterfly Kite

gether with a soft cloth. When the kite is dry decorate it with paint or strips of colored paper in any design you may fancy. The best effects are produced by pasting pieces of colored paper on top of the other paper. Black paper decorations show up to fine advantage when the kite is in flight. Attach the "belly-band" to the



Frame for Girl Kite

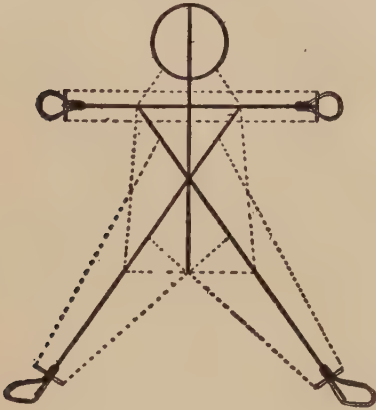
curved sticks by punching a hole in the paper in the same manner as it is attached to the common hexagonal or coffin-shaped kite. With a tail, your kite is ready to fly.

Another interesting design is the boy kite.

With light colored coat and vest and gay striped trousers, the kite standing high in the air always attracts at-

tention and affords splendid sport for the American youth in springtime.

In making a boy kite it should be remembered that the larger the boy is the better he will fly. To construct the frame, two straight sticks, say $3\frac{1}{2}$ ft. long, should serve for the legs and



Frame for Boy Kite

body; another straight stick forms the spine and should be about 2 ft. 4 in. long. For the arms, get a fourth straight stick about 3 ft. 3 in. long. Make the frame for the head by bending a light tough stick in a circle about 7 in. in diameter. Bind it tightly with a strong thread and through its center run the spine. Then tack on the arm stick 3 in. under the circle so that the spinal column crosses the arm stick exactly in the center. Wrap tightly with strong thread and tack on the two sticks that are to serve for the legs and body. The leg sticks should be fastened to the arm stick about 6 in. on either side of the spinal column, and crossed so that the other ends are 3 ft. apart. Tack them and the arm stick together at the point where they intersect. Small hoops and cross stick of the same material as the head frame should be fastened to both extremities of the arm stick and the lower ends of the leg stick for the hands and feet. See that both hand frames are exactly alike and exercise equal caution regarding the foot frames; also see that the arm stick is at exact right angles with the spine stick and that the kite joints are all firmly tied and the kite evenly

balanced; otherwise it may be lopsided. Fasten on the strings of the frame, beginning at the neck at equal distances from the spine, as indicated by the dotted lines in the diagram. Extend a string slantingly from the armstick to the head on both sides of the spinal column, and run all the other strings as shown in the cut, being careful that both sides of the frame correspond in measurements.

To cover the kite, select different colors of paper to suit your taste, and after pasting them together, lay the paper on the floor and placing the frame on it, cut out the pattern. Leave an edge of $\frac{1}{2}$ in. all around and make a slit in this edge every 6 in. and at each angle; make the slits 2 in. apart around the head. After the kite is pasted and dry, paint the buttons, hair, eyes, hands, feet, etc., as you desire. Arrange the "belly band" and tail band and attach the kite string in the same manner as in the ordinary coffin-shaped kite.

The "lady kite" is made on the same principle as the boy kite. The frame may be made exactly as the boy kite and then "dressed" with tissue paper to represent a girl, or it may be made on the special frame, page 81. Remember the dotted lines represent the strings or thread, and the other lines indicate the kite sticks. Be careful with your measurements so that each side of the kite corresponds exactly and is well balanced. Also see that every point where the sticks intersect is firmly tacked and bound.

To cover the kite, first paste together pieces of tissue paper of different color to suit your taste. The paste should be made of flour and water and boiled. Make the seams or overlaps not quite $\frac{3}{8}$ in. wide. Lay the paper on the floor, using weights to hold it down, and place the frame of the kite upon it. Then cut out the paper around the frame, leaving an edge of $\frac{1}{2}$ in. Don't forget to make a slit in the edge every 6 or 7 in. and at each angle. Around the head the slits are cut 2 in. apart, as in the case of the boy kite. After the kite is

dry, paint the paper as your fancy dictates.

To make the breast band, punch holes through the paper, one upon each side of the leg sticks, just above the bottom, and one upon each side of the arm sticks at the shoulder. Run one end of the string through the hole at the bottom of the left limb and tie it to the leg stick; tie the other end at the right shoulder. Fasten one end of another string of the same length at the bottom of the right leg; pass the string up across the first band and tie the other end at the left shoulder. Attach the kite string to the breast band at the point where the two strings intersect. Tie the knot so that you can slide the kite string up or down until it is properly adjusted. The tail band is made by tying a string to the leg sticks at the bottom of the breast band. Let the string hang slack below the skirt and attach the tail to the center. The same general rules apply in attaching the string and tail to the boy kite.

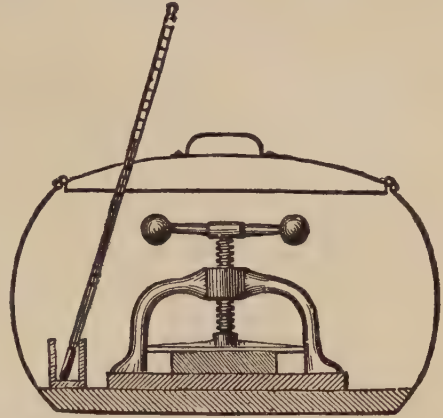
You can make the lady look as if dancing and kicking in the clouds by making the feet of stiff pasteboard and allowing them to hang loose from the line which forms the bottom of the skirt. The feet will move and sway with each motion of the kite.

How to Make Rubber Stamps

India rubber, especially prepared for stamp-making, should be procured from a dealer or manufacturer, if good results are to be obtained. As an experiment, it is possible for an amateur to prepare the rubber, but, in such cases, it is always attended with uncertain results. The mixed uncured rubber comes in white sheets, strong, firm and about $\frac{1}{8}$ in. thick, and for its manipulation a press is indispensable, but can be home-made.

For the base of the press use a piece of iron, having two holes drilled in it at the middle of opposite sides, through which pass bolts, letting the thread ends extend upward and counter-sinking places for the bolt heads to keep the under side of the base level. Solder

the bolts in place at the base. The upper part of the press, or the platen, is also of iron, cut so it can be swung

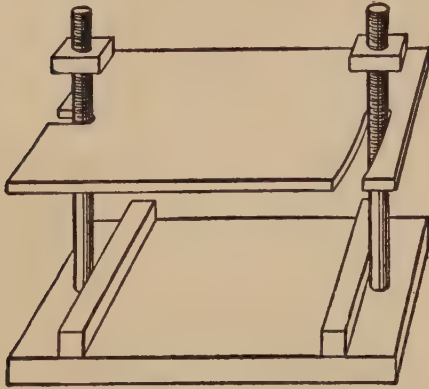


Fish Kettle Vulcanizer

off the bolts, rather than by removing the nuts and lifting it off. String a half dozen nuts, larger than those which screw on, on each bolt, so that when the upper nut on each is screwed to the extent of the thread the pressure will be communicated through the nuts wedged in between the platen and the upper nut. The bolt holes in the platen should be directly over those in the base. Distance pieces of an exact thickness should be provided for use on the base; these serve to keep the pressure even.

In preparing the mould, if type is to be copied, use rather large type with wide spaces and set up with high quads and spaces, or the type faces may be filled up by rubbing with either wax, or soap, lightly brushing off any that remains loose. The type so set should be locked into a frame. This may be made of two pieces of wood bolted together at both ends, or of printer's furniture. Place it on a flat surface (marble is good, but any perfectly smooth surface will do) and place distance pieces $\frac{1}{8}$ in. higher than its upper surface on either side of it. Apply olive oil to the type faces and wipe off any excess. To form the matrix or reverse of the model, take a piece of iron larger than the inscription to be copied, and spread upon it to a depth of $\frac{1}{4}$ in, a putty made by mixing plaster of paris

and water to the right consistency. By means of a table knife spread the plaster smoothly and then invert the plate upon the model and press down until



Vulcanizing Press for Rubber Stamps

the distance pieces are struck. Let it set 10 minutes and then remove. If care has been taken the matrix will be perfect. After it has thoroughly dried, preferably in an oven, saturate it with an alcoholic solution of shellac to strengthen it.

Cut a piece of smooth rubber, large enough to cover the matrix, from the sheet, throw this into a box of talc, or powdered soapstone, so that it receives a coating on both sides; dust a little of the powder over the matrix, also. Place the press on a support over a gas burner, or a kerosene lamp, and apply the heat. Place the matrix on the base of the press, dust off the piece of india rubber and place in the press upon the matrix and screw down the platen. Heat the press to 284 deg. F. and keep screwing down the platen so that the rubber, now soft and putty-like, is forced into every recess of the matrix. A thermometer is not necessary; some rubber always protrudes and the stage of the process can be told from that. At first it is quite elastic, then as the heat increases it becomes soft, then the curing begins and it again becomes elastic, so that, if a point of a knife blade is pressed against it, it resumes its shape when the point is removed. When this takes place it is then thoroughly vulcanized and the sheet can be removed from the matrix. Ten min-

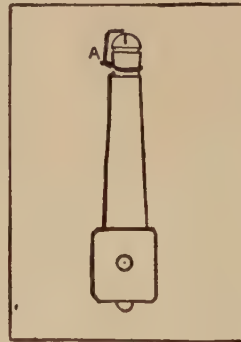
utes, under favorable conditions, is sufficient time for moulding the rubber. By means of common glue, or bicycle tire cement, fasten the rubber stamp to a wooden handle.

It is possible to dispense with the press in making stamps, where the work is not done in quantities, and use a hot flat-iron. The matrix is placed on a stove at low heat, the rubber laid on and the hot iron applied. But a few moments are required to mould it.

An old letter press if it be inclosed in a tin oven makes a good press, or all the necessary materials and apparatus can be purchased from a dealer. Any type such as all printers use will answer.

To Light a Gaslight Without Matches

It is probably well known that if you rub your feet briskly over a carpet on a dry, cold day and then touch any metallic object with your finger it will emit a small spark.



The following amusing experiment may be done on the same principle:

Take any small piece of wire about 2 in. long and twist it around a gas-burner as shown at A in the sketch. Have the tip of the burner about $\frac{1}{8}$ in. below the end of the wire. The wire must be just far enough away from the center of the burner to keep it out of the flame, or else it will melt.

Now get a friend to turn on the gas when you are ready for it. Go around the room once or twice rubbing your feet along the carpet. When you come around to the gaslight touch the point of the wire and if the gas is turned on, the light will flare right up as if it had been lit with a match.

This experiment cannot be done on a damp day or without shoes, and works best in cold weather.—Contributed by E. H. Klipstein.

How To Make a Trap For Rabbits, Rats and Mice

From an old 6-in. pine fence board cut off four pieces $2\frac{1}{2}$ ft. long and one 6 in. square for the end of the trap and another 4 in. by 8 in. for the door. Use old boards, as new boards scare rabbits.

Figure 1 shows how the box is made. It should be 4 in. wide and 6 in. high

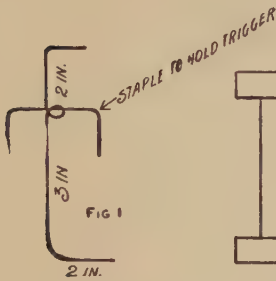


FIG 1

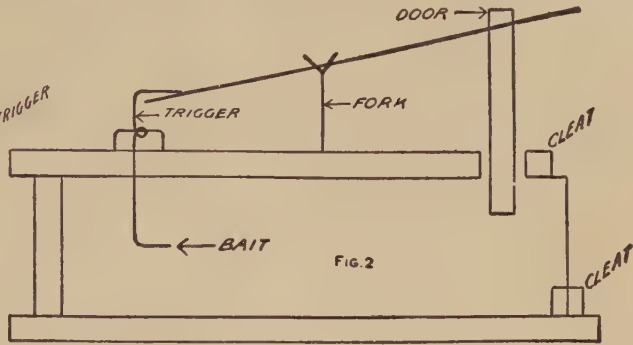


FIG. 2

A Good Trap for Small Animals

on the inside. The top and bottom boards project 1 in. beyond the side boards at the back and the end board is set in. The top board should be 2 in. shorter than the sides at the front. Nail a strip on the top board back of the door and one on the bottom board so the game cannot push the door open from inside the trap and get out.

In the middle of the top board bore a hole and put a crotched stick in for the lever to rest on. Bore another hole in the top of the door for the lever to pass through. Two inches from the back of the box bore a hole for the trigger, which should be made out of heavy wire in the manner shown in Fig. 2. The door of the trap must work easily and loosely.

Novel Electric Motor

The materials necessary to make this motor are an old electric bell of the "buzzer" type and a cogwheel from an old clock.

Remove the hammer-head and gong from the bell, then bend the end of the hammer into a loop, as in Fig. 1. Now make a little wire catch like Fig.

2, and fasten its loop into the loop of the hammer. Mount the bell on a small board as in Fig. 3 and fasten the cogwheel almost on a line with it. Now press down the hammer and place a nail in the position shown in the diagram so that the catch touches one of the teeth.

Fasten the board in an upright position and attach two dry batteries to the binding-posts. If properly connected,

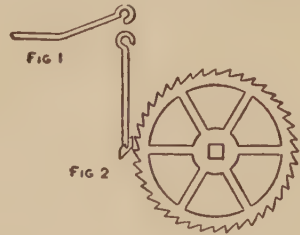


FIG 1

FIG 2

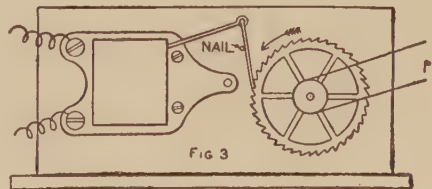


FIG 3

Novel Electric Motor

25c for the bell and if you have an old bell it will cost next to nothing.—Contributed by Fred C. Curry, Brockville, Ontario.

How to Print Photographs on Silk

Silk, satin or any other fine material can be used to make photographic prints, but the most attractive results for the amateur are obtained on silk, the best color for this purpose being either cream or white, says Photography. The chemicals required are only four in number, and a comparatively small amount of each will suffice, so that the process can be tried without any very great outlay.

A dram of dextrine is mixed with 2 oz. of water and allowed to dissolve. It is then made up to 4 oz. with boiling water, and, when cold, a solution of 1 dr. of ammonium chloride in 2 oz. of water is added. As this mixture does not keep well, it should be used as soon as possible after being made up.

The silk is soaked in the liquid until it is thoroughly saturated, which should take about four or five minutes, and it is then hung up to dry, suspending it, tightly stretched, from its two top corners. The fabric when "salted," as this operation is termed, will keep indefinitely. All these operations can be done in daylight.

The next stage is the application of the sensitizer, for which purpose the two following solutions must be made up and then mixed:

Silver nitrate.....	120 gr.
Water	1 oz.
Citric acid	50 gr.
Water	1 oz.

The mixture is spread evenly over the silk with a soft camel's-hair brush. There must be no metal in the mounting of the brush that is used.

Particular care must be taken to see that no particle of the surface of the silk is left uncovered. The best way to insure this is to brush the liquid over the silk, first in one direction and then crosswise. The process of sensitizing must be done in a weak artificial light, such as at night by ordinary gas or lamp light, or in the very feeblest daylight.

The silk is then again fastened up and allowed to dry, but it is now sen-

sitive to the light and the drying must therefore be done in the dark. It is ready for printing as soon as it is dry, and as it does not keep well in the sensitive condition, it should be used up within a few days at the most.

The printing, which is done in daylight, is carried on in the same way as for printing-out papers, except that the silk should be printed a little darker than usual. It will be found convenient to gum the edges slightly, and then to fix the silk on a stiff piece of paper before putting it into the printing frame. If this precaution is not adopted there is a tendency for the silk to slip or crease when it is being examined. The silk must be handled carefully while in the printing frame for this reason, but apart from that, there is no particular difficulty. The paper can be taken off when the printing is finished.

Prints on silk are toned, fixed and washed in the same way as ordinary silver prints. The washing should be thorough, and before the prints are quite dry, they should be ironed to remove all creases.

Removing Old Paint

A chair more than a hundred years old came to me by inheritance. It was originally painted green and had been given two coats of dark paint or varnish within the last 30 years. Desiring to improve the appearance of the relic, I decided to remove the paint and give it a mahogany stain. The usual paint removers would readily take off the two latter coats but had no effect upon the first. I tried to remove the troublesome green in various ways, but with little success until I applied a hot, saturated solution of concentrated lye. By coating the paint with this repeatedly, applying one coat upon another for two days, and then using a stiff brush, the layer was easily and completely removed.—Contributed by Thos. R. Baker, Chicago, Ill.

STUNTS *For the* CAMERA

by Robert Gregg



gun is set in place five feet behind the sheet, as shown in Fig. 1. With the flash, sheet, subject, and camera all placed in their respective positions, you are all set to make the shot.

Just before the exposure is made, all lights in both rooms must be extinguished and the blinds drawn, if any outside light penetrates. When the room is in total darkness, the shutter of the camera is opened and the flashlight ignited, after which the shutter should be immediately closed and the light in the rooms turned on again. That's all there is to it.

TO many amateur photographers, and that includes practically everyone at some time or other, the camera represents a mere snapshot-taking device, while the more puzzling phases of camera craft, the trick photograph and the silhouette, are almost unknown arts. The popular impression that trick photography demands the skill and knowledge of the professional is entirely erroneous, for excellent results can be obtained at the first trial, even with the most inexpensive camera.

Take the silhouette. Here we have a two-tone product in black and white which affords a pleasant relief from the monotonous gray of the ordinary print. Two rooms, with an open doorway between, are needed in making these pictures. The doorway should be entirely covered with a white bedsheet, stretched smooth so that no wrinkles can be seen.

The person to be silhouetted takes his pose two feet in front of the sheet, and in such a position that the face will be in full profile and not even the lashes of the eyes can be seen when the subject is viewed from the location of the camera. A flash

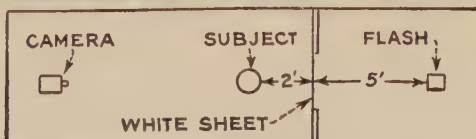


Diagram Illustrating How the Silhouette Portrait Shown Above Was Made with Simple Apparatus



Fig. 6, One That Didn't Get Away; Fig. 7, Posing for the Picture Above; Fig. 8, a Regular "Feat," but Easy to Do; Fig. 9, What Happened to Adonis

dow, with the top of the door leaning back so that it reflected the light of the sky. All other light, except that coming through the window, was shut off. A vest-pocket kodak, with the lens stopped down to f. 11, was used, the exposure time being about $\frac{1}{2}$ minute.

So much for the silhouette. Another form of camera craft especially suited to the amateur is the "cartoonette." This is a combination of a cartooned pen-and-ink sketch, Fig. 3, called a "comic foreground," with an actual head, the result being as shown at the head of this article. Comic foregrounds can be purchased quite cheaply from any large photographic-supply house, or you can make your own by enlarging Fig. 4 to five times the size indicated. Do this on a white sheet of cardboard, about 18 by 30 in., making the squares on the cardboard about $2\frac{1}{2}$ in. on the side. Sketch in the figure lightly with pencil, and then outline and black in with a good grade of India ink, as in Fig. 3.

The manner of using the foreground is illustrated in Fig. 4. The sheet of cardboard containing the cartoon is held on the subject's knees, and arranged by the photographer so that his head rests just above the neck of the cartooned body. A

Development in the usual manner will give you effects like those pictured herewith.

Silhouettes can also be made in daylight if posed before a window which admits an abundance of clear, unobstructed light. Fig. 2 is an example. In making this picture, white paper was tacked on one side of an old screen door, and this was placed outside and a few feet from the open win-

white background is placed behind and the picture taken.

Did you ever go fishing? And catch nothing but little dinky sunfish? Yes? Well, you can still save the day if you have brought along the li'l old camera. Here's the how of it: You simply attach the aforesaid "little dinky sunfish" to the end of your line, pose in the manner shown in Fig. 5, and let your brother fisherman take the picture. Due to the simple principle of angles, the resultant picture will be something like the one shown in Fig. 6—a perfect example of fisherman's luck!

Another wide-angle study is pictured in Figs. 7 and 8. Fig. 7 shows how the camera was arranged in relation to the body in taking the picture, and Fig. 8 how the finished picture turned out. No use arguing—it's some "feat"!

Remember the last time you went to the carnival? And saw your perfectly proportioned anatomy and physiognomy distorted by the convex and concave mirrors?

Funny, wasn't it? The clever amateur photographer can produce the same ludicrous effects, and what's more—they're permanent! The method is simple. You take a photograph of any prize beauty and crease it lightly down the center. That's all. A snapshot of this photo, when developed, will assume the grotesque proportions shown in Fig. 9. Other effects can be produced by creasing the photograph across or by bending it diagonally, as shown in Figs. 10 and 11 respectively.

Perhaps one of the oldest of camera tricks is "The Man in the Bottle." In the illustration, Fig. 13, it is "The Girl in the Bottle," but in any case the method is identical, and good results can be obtained out of doors with any ordinary vest-pocket camera.

Have the subject stand on a box which has been covered with a black cloth, and take a snap of him, or her, from a dis-

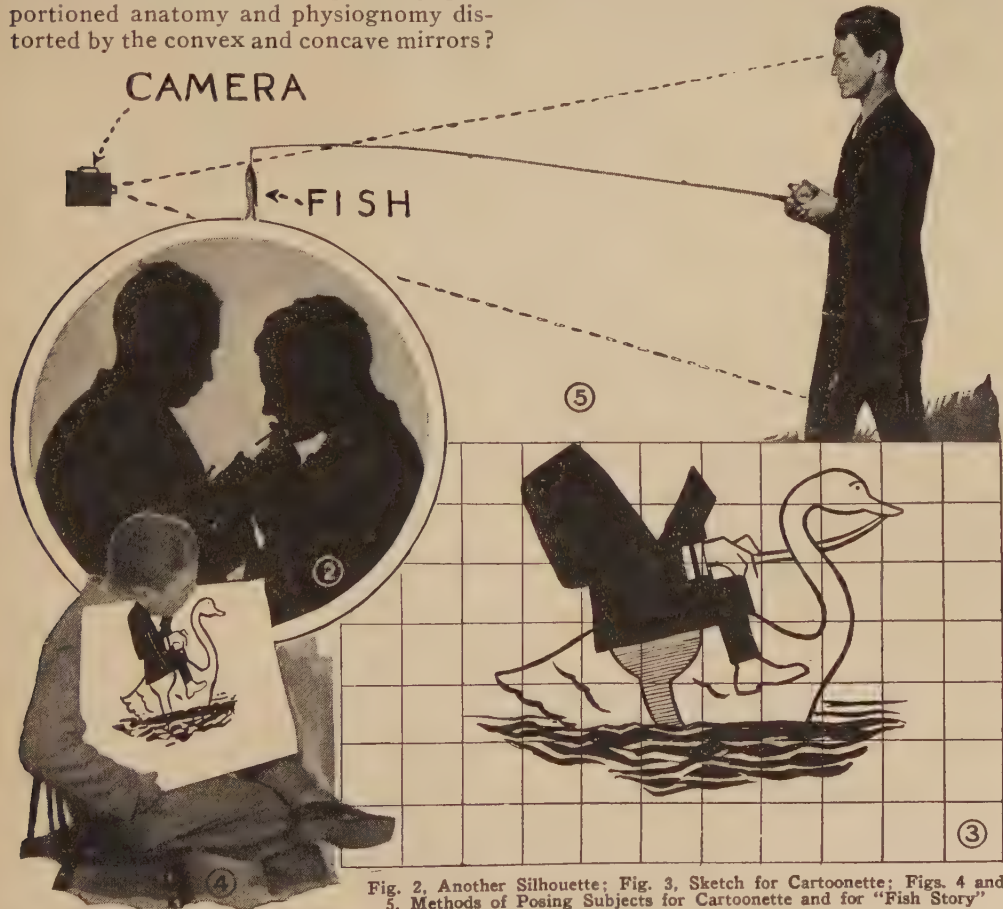


Fig. 2, Another Silhouette; Fig. 3, Sketch for Cartoonette; Figs. 4 and 5, Methods of Posing Subjects for Cartoonette and for "Fish Story"



Figs. 10 and 11, Further Examples of Simple Distortion; Fig. 12, "The Girl in the Bottle," or "Canned Peach," If You Prefer to Call Her That

tance of 15 ft., resting your camera on some solid object. Then obtain a large clear bottle and place it in such a position that the outline of the bottle will be sure to extend all around the subject's picture. Snap the bottle on the same film. Make this exposure a trifle longer than when

taking the picture of the subject. With a little experimenting you will be able to produce this quaint effect as easily as taking an ordinary snapshot.

The example shown in Fig. 13 is an advanced double-exposure stunt but, while this demands somewhat more skill than the previous tricks, the procedure is still simple. The photograph of the girl was taken first, using a black background. The picture of the man was then taken, full size, on the same plate.

The making of stunt pictures like these will add greater interest to the possession of a small camera, for sooner or later the amateur photographer becomes tired of



Look What Came Out of the Ink Bottle; an Advanced Double-Exposure Trick, but One That Also Is Comparatively Easy to Do

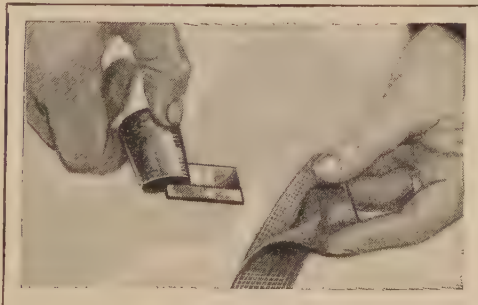
the eternal sameness of his snapshots, and looks for other worlds to conquer. Stunt pictures afford a new world of pleasure, not only for himself, but for his friends also, and mean the reanimation of interest in a worth-while hobby.

Rain Cap for the Gasoline Hose

Most gasoline pumps provide a holder for the hose, which keeps the open end of the nozzle upward. The objectionable feature of this position is that heavy rains fill the hose with water, with the result that some customer gets a liberal portion in his gasoline. To prevent this, one gas-station owner made a special cap for the hose nozzle to keep out the rains. It was made of brass, with a slight taper to match that of the nozzle. The small end was closed by soldering on a disk of the same metal. A small chain was fastened to the open end and to the nozzle base. When the cap was removed, it hung from the nozzle by the chain. After use of the hose, the cap was placed over the nozzle and the latter hooked on the hose rack of the pump. No water from rains has entered the hose since the cap was provided.

Cork Holds Razor Blade for Ripping

An old safety-razor blade is a handy tool for ripping seams and other similar jobs. However, the thin blades are rather hard to hold with the fingers. To provide a suitable handle sink one end of the blade into a cork as shown in the photo. This makes it much easier to manipulate the blade.—Frank W. Bentley, Jr., Missouri Valley, Ia.



Ordinary Cork Used for Handle of Safety-Razor Blade When Ripping Seams

Rowboat Operated by Bicycle Mechanism

Finding rowing too hard, slow and generally inconvenient, one rowboat owner installed a bicycle mechanism to propel it.

Bicycle Mechanism Fitted to Rowboat and Driving a Propeller Provides More Speed and Less Hardship



Two cranks were provided instead of one, so that both hands and feet could be used, which was found to be less tiresome than using either alone. The chain drive is connected to a small propeller.

Paraffin Used for Waterproofing Canvas

For waterproofing canvas, paint it with a solution of paraffin and gasoline. The solution is prepared by dissolving as much paraffin, cut into small, thin shavings, as the gasoline will absorb. When applied to the canvas, the gasoline carries the paraffin into the pores of the cloth, after which it evaporates, leaving a sediment of paraffin that waterproofs the cloth effectively. The solution can be applied by means of an old whiskbroom. If it is let stand for any length of time, more gasoline will have to be added to replace that lost by evaporation, and the solution must be stirred thoroughly.



Washer Laid over Tack to Be Pulled Provides Leverage and Prevents Objectionable Marks

Easy Method of Removing Tacks

The screwdriver is an ever-ready tool for the average house owner to dig out tacks. Its efficiency at this job can be improved considerably by using a small washer as shown in the illustration. The washer is put over the tack and provides a good fulcrum, holds the screwdriver in place, and makes it possible to pull out a stubborn tack without marring or nicking the wood.

Rubber Cap on Broom Handle Protects Varnished Surfaces

Rubber caps of the kind used on the ends of crutches can be obtained in various sizes at almost any drug store. It is a good idea to provide the broom and mop handles with these caps in order to avoid marring papered walls and varnished woodwork, for, when one is busy working, it often happens that the end of the handle hits a piece of furniture or the broom is inadvertently placed against the wall.—W. W. Snypp, Lakewood, Ohio.

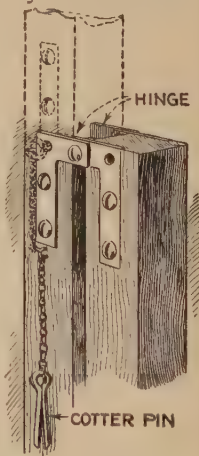


Oiling the Doormat

After some use, coco and other fiber doormats collect dust, which is naturally tracked into the house. This nuisance can be entirely avoided by spraying the mat with cedar oil, using a fine garden or fly-poison sprayer. Apply just enough oil to barely cover the surface of the mat. If this is done properly, you need have no fear of the oil being tracked into the house. By giving the mat an occasional shake, all dirt and dust can be removed, and it will always be clean.—L. B. Robbins, Harwich, Mass.

Collapsible Tent Pole

In order to economize on space when touring, a collapsible tent pole of the kind shown in the drawing will be found of considerable utility. If the pole length is 6 ft., only one joint is necessary, and a length of hardwood, 1 in. square, will be satisfactory. The pole is cut in two equal pieces which are hinged together by means of ordinary flat-iron angles adapted to this purpose as indicated. Four of these angles are required. They are attached securely by means of wood screws so that the ends project and are in alignment. A machine screw can then be inserted to serve as a pivot. A short chain and a cotter pin are attached by means of a staple or screw eye, the pin being used to hold the hinges together when the pole is set up at full length.—Claude P. Fordyce, Falls City, Nebraska.



Method of Preserving Paint and Enamel

Everyone who has used paint and enamel knows that, if the can is not emptied but the rest put away for the future, the paint in time becomes hard and useless. A good method of preventing this trouble is to melt some paraffin and pour it over the paint as soon as one has finished using it. This hardens over the surface of the

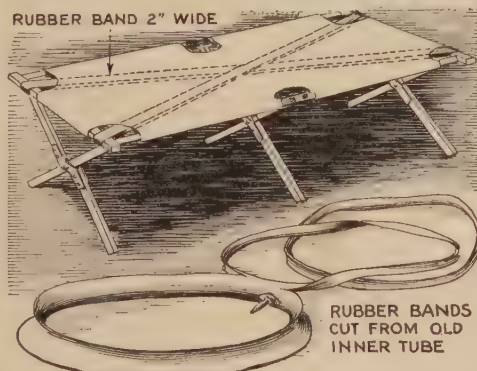
paint but provides an effective seal against the air, thus keeping the paint in good condition indefinitely.—Charles Latour, Jr., Plattsburg, N. Y.

How to Make an Ornamental Box with Button Design

A useful box ornamented with pearl buttons can be made from a wooden cigar box, a mint container of the 1-lb. size or a coffee tin. Cover the outside surface with a sizing coat of glue, and after this is dry, apply gesso or Egyptian clay to the top and sides to a thickness of about $\frac{1}{8}$ in. While the clay is still soft press a row of flat pearl buttons of uniform size into it around the edge of the lid. If desired, you may make a simple design of buttons, such as a four-leaf clover, in the center of the lid. With a stiff brush stipple or swirl the clay in the spaces between the trimming, both on top and on the sides. After the clay has set, apply gold bronze to the stippled spaces with gold paint and give the button border and central figure any colors desired with paint. Green or red buttons make a very lively trimming against the gold-bronze background. Also paint the inside of the box with gold-bronze paint.—Hilda Ellyson Allen, Onawa, Iowa.

Camper's Cot Made Comfortable with Rubber Bands

Two long rubber bands, about 2 in. wide, cut from an old inner tube and stretched diagonally underneath the canvas of a folding cot, as indicated in the illustration, will add greatly to its comfort. Smaller bands, about $\frac{3}{4}$ in. wide, run crosswise under the cot and over the bedding at the ankles and the waist, will prevent an uneasy sleeper from throwing off his covering. When the cot is folded, these bands can be used to hold the cot in a compact bundle.



Rubber Bands Cut from Inner Tubes Increase Comfort of a Camp Cot and Hold the Bedding in Place



Detachable Handles for the Outboard Motor Are Convenient for Carrying It

Detachable Handles for Outboard Motor

An outboard motor is an unusually bulky article and difficult to carry, because there is almost no way of getting a firm hold of it. One cannot grasp the steering handle, timer lever or other projecting parts, for fear of damaging them. Hence, specially made handles, fitting the spark-plug holes of the cylinders, will be found convenient. Each handle is made of cold-rolled steel rod, bent to the shape most suitable for the purpose, and the end is fastened to the body of an old spark plug, by threading the handle end and using nuts to hold the parts together or

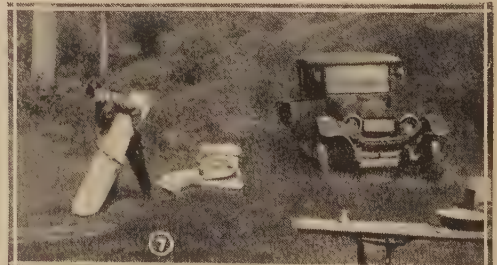
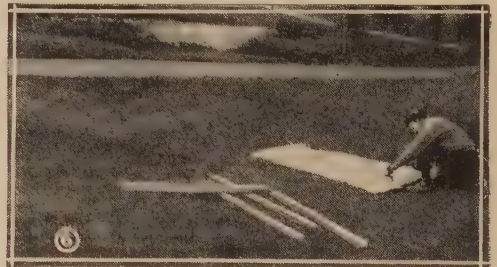
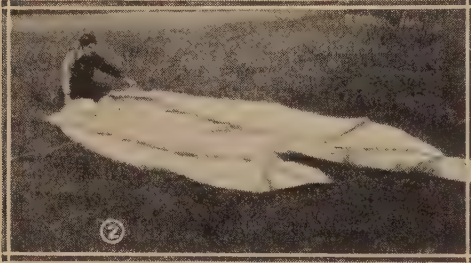
by welding. Such a pair of handles occupy very little space in the tool box. When the motor has to be lifted and carried or handled in any other way, all that is necessary is to remove the spark plugs and screw in the handles in the spark-plug holes.—John Edwin Hoag, Los Angeles, Calif.

How to Fold a Tent Single-Handed

By R. R. CARRYL

WHEN out camping, there is usually more than one person to help in breaking camp, taking down the tent and packing up the provisions and accessories. Sometimes, however, it is necessary to fold the tent single-handed; this is often considered quite a difficult job, but anyone can do it without trouble by carefully following the instructions contained in this article and proceeding along the lines indicated in the accompanying photographs. Although this method may require a little longer time to do the work than it would with the help of an assistant, the job can nevertheless be done just as well.

The first step in taking the tent down is to loosen all the guy ropes except the corner ones, Fig. 1. The butts of all the ridgepoles are then moved over toward one side, for instance, the right side as you are facing the opening of the tent, and the two corner ropes on the left side are then loosened. As the poles are set at an angle their weight will prevent the tent from falling over until the corner ropes on the right side are loosened, and the



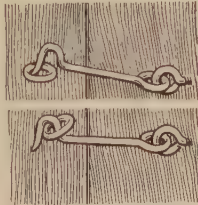
Striking Camp and Folding and Packing the Tent Are Usually Formidable Jobs for One Man, but by Using the Method Shown in the Above "Movie," the Task Is Made Comparatively Simple; the Photos Show All the Steps in Taking Down and Folding the Tent, in Proper Sequence

tent allowed to tip and fall over to the left. One side of the tent is then carried over so that the inner side of the tent is entirely exposed and the outside and all the guy ropes underneath. The poles are removed and packed separately. The tent sides, which include all the material up to the edge of the roof where the guy ropes are attached, are folded over toward the inside, care being taken to straighten out the ends and the flaps of the opening, Figs. 2 and 3. Keep all the guy ropes outside. Fold the tent over again, as shown in Fig. 4, so that the width is a little less than the length of the carrying bag. If you have no carrying bag, the width should correspond to the space allowed for storing the tent. All the ropes now project from one side. Bring both ends over toward the center, as shown in Fig. 5, and after folding all the ropes in, start rolling the tent to form a tight bundle, Fig. 6. Stop just as the roll is finished so that its own weight will hold it in place while you get the carrying bag. Then, holding the rolled tent under one arm, proceed to slip on the cover, as shown in Fig. 7. After this is done, draw a rope through the brass eyes to close the bag tightly. If the bag is placed where rain can get at it, be sure to set it in such a position that the opening is underneath, in order to prevent the rain from penetrating to the inside.

To waterproof the bag or the tent, dissolve paraffin in gasoline and apply to the canvas. The paraffin fills the pores and effectively waterproofs the fabric.

Fastening Screen-Door Hook Securely

Most screen-door hooks can readily be opened by merely striking the door, the jar causing the hook to jump up out of the screweye. To prevent this from occurring, as is often desired, especially when the doors are left open all night during the summer months, it is only necessary to turn the screweye over a little, forcing it over the end of the hook. When this has been done, the hook cannot be opened until the screweye is turned back to its original position.



Rake Made from Discarded Magnets Is Useful for Picking Up Nails and Tacks

Magnetic Rake Picks Up Nails

I had numerous tire punctures caused by nails picked up in the alley, outside my garage, and decided to eliminate this trouble by the use of a magnetic rake. This was made from discarded Ford magneto magnets, which anyone can obtain from a junk yard for a few cents, and the photo clearly shows its construction. In a few minutes, I picked up over two quarts of spikes, nails and tacks from a small space.—C. H. Rise, Rapid City, S. Dak.

Aluminum Paint for Auto Rims

Auto rims become rusty after having been in use for some time. Graphite paint is often applied to the rim to prevent the accumulation of rust, but this does not always prove effective. It is better to scrape as much of the rust off as possible, clean the rim thoroughly and then apply a coating of aluminum paint. This covers well and adheres to the metal for a considerable length of time.—Thomas Blaine, Evanston, Ill.



Two Hooks Attached to a Stove Provide a Handy Place for the Teakettle

Hanger on Stove Keeps Teakettle Out of the Way

On a small gas range it often happens that the teakettle is in the way when cooking, and it is rather difficult to find another place to put it. Two hooks, made of heavy galvanized-iron wire and bent as shown, are attached to the side of the stove. Hung on these, the kettle is out of the way entirely, yet readily accessible.—C. D. Paterson, Worcester, Mass

Effective Ant Exterminator

The best ant exterminator I have ever used consists of the following ingredients: arsenate of soda, $\frac{1}{4}$ oz.; white sugar, 1 cupful; cream of tartar, $\frac{1}{4}$ teaspoonful; hot water, 1 pt. Mix and stir these ingredients until the sugar and soda are completely dissolved. Then take three baking-powder cans with tight-fitting lids, and punch several small holes below the covers so that the ants can get in. Put some of the poison in each can and mark the cans conspicuously to indicate that they contain poison. Set the cans near the path of the ants, and in three days they will have disappeared.—William B. Stone, San Jose, Calif.

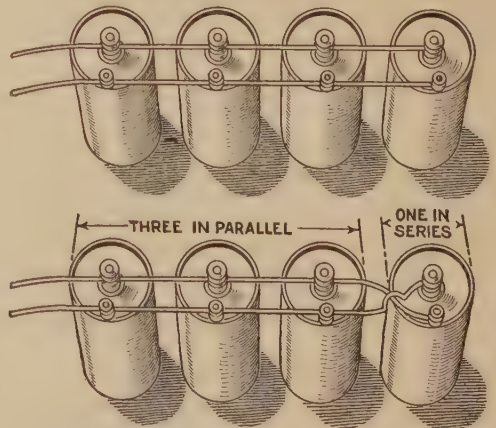
Beaded Hook Attracts Fish

There are innumerable kinds of trolling hooks, spoons and spinners on the market, but one that should prove just as good as any of these, can be made in a few moments from an ordinary hook. Heat the eye of the hook and open it up. String as many glass beads, of various colors, as possible on the shank. Use a bead with a small hole for the first one so that it will bind at the sharp bend of the hook, and not go to the barb. Heat the eye again and bend it back to its former shape. It can be hardened by plunging it in cold water. The colored beads will prove an attractive lure for bass, and other fish.

Increasing the Voltage of Run-Down Dry Cells

When three or four dry cells, hooked up in parallel, have run down so that their combined output is less than $1\frac{1}{2}$ volts, their power can be increased temporarily by reversing the connections of one end cell, as shown in the lower detail of the illustration. This is done by connecting the center post or positive terminal of the end cell to the side or negative terminal of the next cell, which is connected in parallel with the rest of the cells. Then the negative terminal of the end cell is connected to the positive terminal of the next cell. This arrangement adds to the voltage of all the cells without increasing their amperage, permitting them to be used for a longer period of time.

USUAL PARALLEL HOOKUP



Reversing Connections on End Cell Increases the Voltage of Entire Bank

Hints for the Painter

When using white or red lead, or any paint in paste form, the worker often has trouble in keeping the contents moist, as the lids on such cans are not generally air-tight. A satisfactory method of keeping the material from hardening is to spread a piece of ordinary wax paper over it, pressing it down smoothly over the entire exposed surface. I have found that a wire strainer of the kind used in the kitchen is useful for straining paint. It will hook across the top of almost any can, leaving the worker's hands free to attend to the pouring.—Eric B. Roberts, Regina, Sask., Can.

Protecting Lawns

Ordinarily the public is kept from walking on a lawn or freshly seeded places by the simple method of driving a few stakes around the space and running wires between them. Such barriers, although effective, soon lose their rigidity and then detract from the neat appearance. This is because there is no "give" to the wires and at the first contact the stakes are



pulled loose and the wires sag, speedily rendering the barrier ineffective and more or less dangerous. A noticeable departure from the conventional method is shown in the illustration, coil springs being arranged at each corner post. The springs keep the wire stretched taut and there is sufficient give to prevent the wire from pulling the posts loose under ordinary conditions.

Cheap Balcony a Substitute for Porch

When building a small home, where the appropriation does not allow for an upstairs porch, an airing balcony of the kind shown in the drawing will be found an ideal substitute. It is narrow and can be



This Airing Balcony Is a Good Substitute for a Porch and Costs Much Less to Build

built after the house is completed, if desired. A railing of some kind should, of course, be provided for safety. For the airing of bedding and mattresses, shaking rugs and brushing clothes, such a balcony will be of considerable utility. Poles, held by suitable wooden brackets, fastened to the side of the house, may be provided for hanging rugs.

Photo Holder on Manuscript

I have found it very handy, when mailing a photo with a short manuscript or letter, to attach an envelope to the manuscript as shown in the accompanying illustration. Simply apply a little glue or library paste to the four corners on the face of the envelope and attach it to the sheet. This forms a convenient pocket for the photo, preventing it from being lost and protecting it from damage while en route.—Thomas Blaine, Evanston, Ill.



Improving Camper's Bed

The camper's stretcher bed is usually made of a piece of canvas with a hem in



Camper's Bed Consisting of a Doubled Length of Canvas, Which Provides Dead-Air Space

each side to fit the supporting poles. A good bed of this type consists of a doubled piece of canvas about 7 ft. long. This enables the user to insert the poles without any trouble and permits the use of poles that would perhaps be too large or too rough to be inserted in the hem. When set up, the top and bottom surfaces of the canvas inclose a layer of air, which acts as insulation to keep the sleeper's back warm. Leaves, grass or extra clothing may be inserted in the open ends of the canvas to make a dead-air space.—J. F. Hayes, Chicago, Ill.

Remedy for Squeaky Auto Brakes

Auto brake linings often become glazed, which causes them to squeak and operate unsatisfactorily. This fault can be easily overcome by treating the brakes in the following manner: Apply kerosene to the brake lining by means of an oilcan. After this, fill the can with neat's-foot oil, and apply in a similar way. Such attention, once a month, will keep the brakes in a dependable condition and silent. Of course, brakes treated in this manner will not be fit for use immediately afterward, especially if the kerosene and oil have

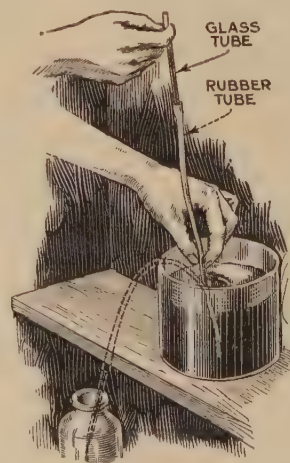
been applied quite liberally. The surfaces of both drum and lining are then covered with oil, reducing the friction and allowing the brake to slip.

How to Waterproof Matches

On camping trips I often had considerable trouble in keeping matches dry, until I waterproofed them in the following way: I obtained a small plug-tobacco tin, the kind that has a wide cover and is large enough to hold a layer of matches. After these were put in, they were covered with melted paraffin. Another row of matches was laid down in the soft paraffin, and more paraffin was added, the process being repeated until the box was full. You will find this method entirely satisfactory, and you will have bone-dry matches. They can be readily removed by means of a penknife or other sharp-pointed tool, digging them out carefully to prevent breaking them.—E. J. Cutting, Marilla, New York.

Starting a Siphon

In starting the siphoning of liquids with the mouth carelessly, one may get a mouthful, which is rather unpleasant if not dangerous, especially in case of gasoline or other oil. This risk can be overcome by inserting a length of glass tubing in the siphon hose. The tube enables you to see the liquid as it rises and you



can stop sucking before it reaches the mouth. Pinch the tube to prevent back flow, place your finger over the open end of the glass tube to hold the vacuum, insert the free end in the vessel that is to receive the liquid and no trouble whatever will be experienced.—W. F. Schaphorst, Newark, New Jersey.

experienced.—W. F. Schaphorst, Newark, New Jersey.



Golf in Your Own Backyard

By SAM BROWN

FOR SOME reason or other, many people associate golf with men of such occupations that their office hours are from late morning to early afternoon; they never consider the excellent sport in this game as something which they can enjoy themselves.

But why not? Two or three clubs and a course that you can lay out yourself, and there you are. Of course, you may not have the technique of a Hagen, Jones or Barnes, but in your own way you can

laid out in a pasture or large vacant lot if you live in the country or suburbs; but if not, then your own backyard can be converted into something quite "golffy." Get a number of tin cans of the variety which come with lids. Dig a few holes here and there and plant your tin cans in these, patting the dirt down smoothly around each hole.

In the relative arrangement of these cans, you must exercise your ingenuity by



The Holes for Putting Practice in the Backyard Course Are Tin Cans, Buried in the Ground, and Covered with the Lids When Not in Use



get much fine sport and exercise out of the game in this fashion.

First of all, the course: This can be



placing them so as to take advantage of natural hazards in the shape of streams of water, clumps of low trees, etc. In one vacant-lot "club," the course is composed of five holes, spaced at from 125 to 200 yd. apart, and in the complete round the player must drive over a small stream of water twice, as well as skirt three areas of low timber. It is not likely that your golf site will duplicate this arrangement, but by taking advantage of the natural lay of the ground in the placement of your holes, you can readily map out something equally good or better.

Small homemade flags should be used to designate each hole, as the drive from one hole to another would be impossible if there were not some form of marker at which to direct the ball. The lids of the cans should be put in place when the course is not in use in order to keep the holes clean and water-tight.

Lacking the pasture or

Excellent Practice in Driving Is Obtained with a Target Fastened in the Garage Doorway, the Placing of the Shots on the Target Being Used to Determine Where the Ball Is to Be Placed for Putting

large lot, the amateur golfer can lay out an equally sport-giving course in his own back-

yard; and all this without disturbing the position of the garden or the wife's rose bushes.

The procedure, however, differs somewhat. The average backyard can easily accommodate two or more of the tin-can holes described before, but due to the

limitations of the ground these are only available for putting. If you wish something at which to drive, a large stretch of canvas (the fly from a tent does the trick nicely) can be painted with a target and hung in the door of the garage. The manner of using this target is as follows: Tee up your ball about 10 ft. back, after having dipped it lightly into some white chalk or flour, which you should keep conveniently placed in a small can. Let

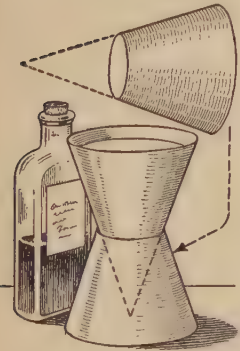


drive! Your ball will zoom forward, smack into the canvas (a miss being almost impossible), and the white powder on the ball will leave its mark on the target. A direct hit entitles you to place your ball at a certain point on the two or three-hole course, readily accessible to holing out in one or two shots, while poorer hits place the ball in more difficult approaches. For a complete miss of the target or ball, a sand trap consisting of a box of sand can be used, and the ball buried halfway in this.

After completing the first hole, the drive for the second hole may be made, or, if desired, the complete two or three-hole course can be played with but one drive, the succeeding holes being made in the usual putting manner. It is golf on a small scale, certainly, but with care in placing the holes so that they can be played in various manners, the sport becomes something almost equal to that played on the full-sized links, and it affords splendid practice.

As to the clubs used to play these miniature courses, two are sufficient. These should be a driver and a putter, and any sporting-goods store can furnish you with inexpensive yet serviceable clubs for as little as \$1.25 each. Other clubs, especially a brassie, may be added if your pocketbook allows, but these are not absolutely essential, since the two clubs mentioned will take care of almost any shot which can be laid out in these miniature links.

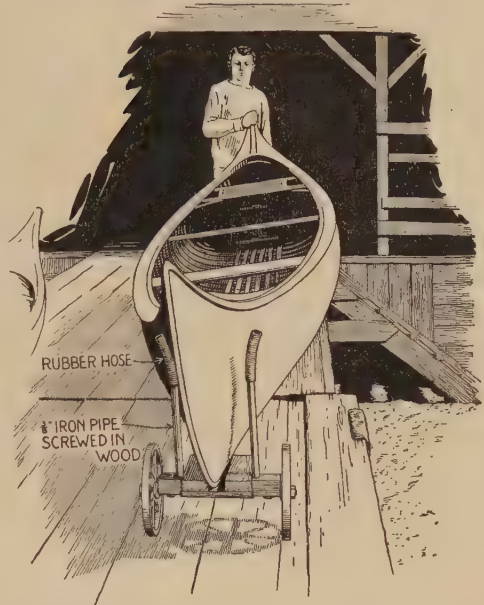
Holder for Conical Paper Cup



It is often rather inconvenient to use conical paper cups, as they cannot be set down when filled with liquid. This difficulty can readily be overcome by cutting off the end of another cup, setting it upside down on the table and then placing the filled cup into

the top opening. This has been found valuable also in administering medicine.

Serviceable Canoe Jig for Boat House



Two-Wheeled Jig Facilitates Transportation of Canoes in Boat House

For running canoes in and out of a boat house, it will be hard to beat the illustrated jig. It has been in use at a shore resort in Connecticut and has given complete satisfaction under rough usage. It consists of a wooden frame mounted on two cart wheels. Two lengths of iron pipe are set vertically in the frame, the tops being bent outward a trifle and covered with lengths of rubber hose, as indicated. In use, the bow of a canoe is set loosely on the jig between the pipe supports, the keel fitting in a slot cut to receive it. By tipping the opposite end of the canoe when transporting it, the jig can readily be steered. As it is small, the jig can be hung overhead within easy reach. The rubber bumpers on the ends of the pipe supports prevent marring the canoes. The construction details are plainly indicated in the drawing.—Henry S. Laraby, New Haven, Conn.

¶ If you have to pour gasoline into your tank and have no funnel at hand, take a short piece of inner tube, stuff one end into the tank and have someone hold the other end open so that you can pour in the gasoline.



Eyeshade for Reflecting Type of Camera Enables User to Work with Greater Speed

Eyeshade for Reflecting Cameras

Efficient use of the reflecting type of camera is largely dependent on complete darkening of the hood when focusing. In years of practice, I have sought some method of obtaining instant and complete darkness within the hood, and after various trials and errors, I developed the eyeshade shown in the illustration. It works so well that it has enabled me to take pictures in much less time than is usually required. When not in use, the eyeshade is worn tipped back on the head and thus is easily brought down.—John Edwin Hoag, Honolulu, H. I.

Tape Repair for Garden Hose

To cut out the bad portion of a garden hose and then connect the two good ends by a sleeve to which they are securely held by means of clamps, is good practice in case of a very bad break or cut, but not for the numerous leaks of an old hose. For a few cents, enough material can be had to make repairs that will stop the leaks and make the hose last a long time. Get a roll of ordinary electricians' friction tape, a tube of tire-patching cement and some thin rubber, from toy balloons, for example. The leaky place on the hose is first wiped clean, and a piece of rubber

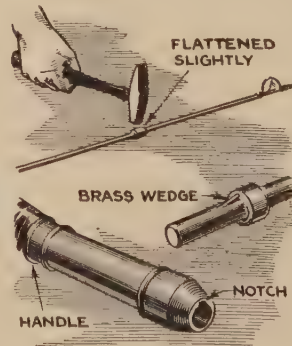
is cut or torn to fit over the bad spot. Both the patch and the surface of the hose where the patch is to be applied are given an application of the cement, which must be allowed to become apparently dry before the cemented surfaces are put together. After the patch has been put on, wrap tape around the repaired section of the hose. Shellac or ordinary paint applied to the tape will prevent it from becoming loose.

Mouse-Proof Desk Drawer

When looking through the lower drawer of my desk for a manuscript, I found that a mouse had gnawed a hole in it and begun to build a nest, using some of my manuscripts as material. Fortunately, much damage had not been done, and I at once took steps to prevent the mouse from entering again. To this end, I tilted the desk so that the bottom was exposed and tacked a piece of fly screen over the whole underside. This proved entirely satisfactory, as it could not be seen, did not interfere with the movement of the drawers, and effectively kept the mice out.—H. H. Siegele, Emporia, Kans.

Keeping Casting-Rod Guides in Line

When bait-casting with a steel rod, I had trouble in keeping the guides in line, so I flattened the brass joints slightly by tapping them with a hammer. The joint between the handle and the first guide is not flattened, however. A better method is to notch the inside of the handle with a file, as shown in the lower detail, and to solder a short piece of wire or a strip of brass, about the length of a shingle nail, to the end of the first section to fit the notch. When soldering, care must be taken not to hold the iron on the soldered seam so long that it will loosen.—Adolph Reiter, Marinette, Wis.



An Electrical Walking Stick

A cane that will produce an electric shock when shaking hands is one supplied with the electrical apparatus shown in the sketch. An ordinary cane, 1 in. in diameter at the top and having a metal band A, is bored about 8 in. deep, to receive the battery B and induction coil C. One of the electrical connections is through the metal tip D to the earth, the other is through the



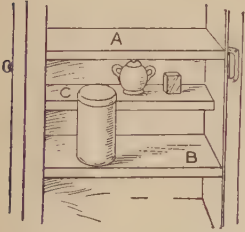
Battery and Coil in Cane

metal band A when the push button E is pressed.

The one using the cane merely holds the metal end D in contact with the earth and while shaking hands with a friend he pushes the button and starts the coil in operation.—Contributed by Stanley Radcliffe, Laurel, Md.

Convenient Shelf Arrangement

A convenient device for crowded shelves and cupboards is shown in the accompanying sketch. Halfway between shelves A and B is installed a second shelf C which is only half as wide as the other shelves. This

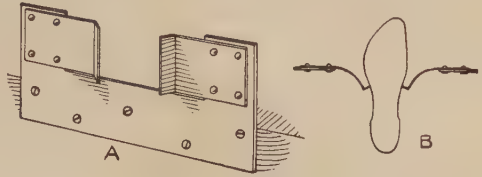


provides a convenient place for small articles and utensils, while in a china closet it furnishes a splendid space for cups, sauce dishes or other small pieces. It also adds a neat and pleasing appearance.—Contributed by E. M. Williams, Oberlin, Ohio.

A Shoe Scraper

On steps of public buildings, shops and dwellings is usually found some sort of a mud scraper for the shoes. These remove the mud from the sole of the shoe and leave it on the edge

and sides. The scraper shown in the sketch is of simple construction, and removes the mud from the soles and

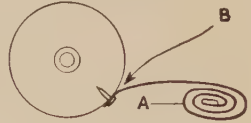


Scraper of Thin Steel

sides of any size shoe in one operation. The scrapers spread and bring pressure to bear on all sides. The side scrapers must be made of metal that will spring. The standard is of heavy sheet metal with the thinner strips riveted to the projecting uprights at the ends.

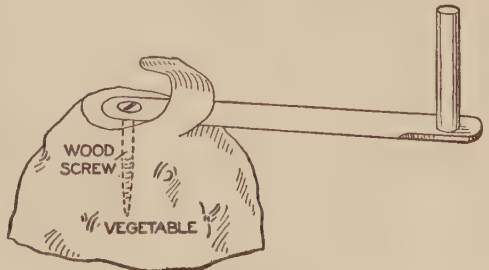
Fastening a Shade to a Roller

Tack the shade A in the usual manner and roll it as far back as possible and while in this position apply an ample quantity of glue near the tacks, as shown at B. A shade attached in this manner will not come loose from the roller.



Vegetable Slicer

The slicer is made of a knife blade, screw and pin handle. The screw is soldered into the end of the knife blade. As the screw feeds into the vegetable

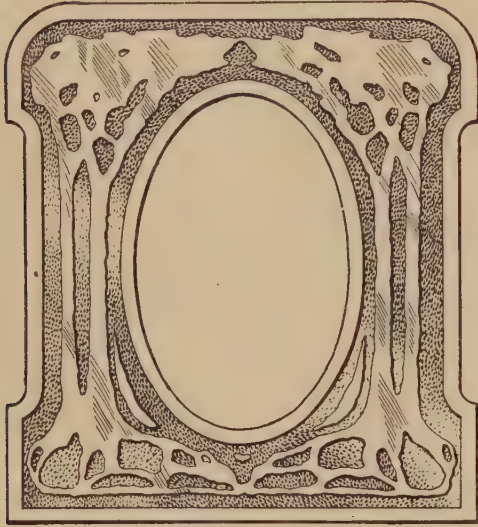


Slicer in Vegetable

or fruit, the blade will slice it in a curl of even thickness.—Contributed by H. C. Roufeldt, Toledo, O.

How to Make an Etched Copper Picture Frame

Secure a heavy piece of copper about 8 or 10 gauge, cut to 7 by 7 $\frac{3}{4}$ in. Make a design on a piece of paper. The accompanying sketch offers a suggestion.



Etched Copper Picture Frame

If the design is to be symmetrical, draw a line down the middle of the paper, make one-half the fold and trace the remaining half by placing a piece of double-surfaced carbon paper between the halves. Fasten this design with a little paste on the copper at two of its corners and trace it on the copper by means of the carbon paper.

Remove the paper, and, with a small brush and black varnish or asphaltum paint, cover the part not to be eaten by the acid of the bath into which the metal is to be immersed. Two or three coats will be necessary to withstand the acid. The conventional trees, the border as shown in the illustration, and the back are covered with the varnish or asphaltum.

The etching solution should be put in a stone vessel of some kind and care should be taken not to allow it to get on the hands or clothes. A stick should be used to handle the metal while it is in the solution. This solution is made by putting in the stone jar the following: Water a little more than one-half, nitric acid a little less

than one-half. *Do not add the water to the acid.* Leave the metal in this solution three or four hours. The time will depend upon the strength of the acid and the depth to which you wish the etching to be done. An occasional examination of the object will show when to take it out.

When the etching has been carried as far as desirable, take the copper from the bath and remove the asphaltum by scraping it as clean as possible, using an old case knife. After doing this, put some of the solution, or pickle as it is called, in an old pan and warm it over a flame. Put the metal in this hot liquid and swab it with batting or cloth fastened to the end of a stick. Rinse in clear water to stop the action of the acid. When clean, cut the metal out from the center where the picture is to be placed, using a metal saw.

Solder on the back several small clips with which to hold the picture in place. There must also be a support soldered in place to keep the frame upright. To further clean the metal before soldering, use a solution in the proportion of one-half cup of lye to 3 gal. water. Heat either the solution or the metal just before using.

When soldering, care must be taken to have the parts to be soldered thoroughly clean. Any grease or foreign matter will prevent the solder from running properly. On a piece of slate slab, heavy glass or other hard, non-absorbent substance that is clean, put a little water and grind a lump of borax around until the resultant is like thin cream. Thoroughly clean the parts that are to be soldered by scraping with a knife, and do not touch with the fingers afterward. Place a piece of thin silver solder between the parts after having coated them and the solder with the borax. Use a pair of tweezers to pick up the solder. Hold the parts firmly together and apply heat—slowly at first until all moisture has been expelled and the borax crystallized, after which the flame may be applied more directly and the parts brought to a soldering heat. An alcohol flame will

do. Heat applied too quickly will throw off the solder and spoil the attempt.

painted in some pretty tint, or, if preferred, may be enameled.—Contributed by G. J. Tress.

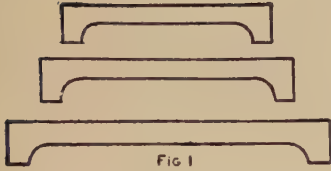


FIG. 1



FIG. 2

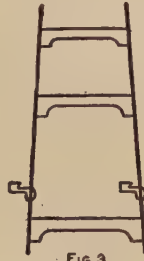


FIG. 3



FIG. 4

Details of Easel Construction

There are various ways of finishing the metal. It may be polished by means of powdered pumice, chalk or charcoal, and then treated with a coat of French varnish diluted ten times its volume in alcohol. Another popular way is to give the background a bluish-green effect by brushing it over a great many times, after it has been cleaned, with a solution composed of muriate of ammonia, 1 part; carbonate of ammonia, 3 parts; water, 24 parts. The whole may then be treated with French varnish to preserve the colors.

How to Make an Easel

A strong and substantial easel may be made at home with very little expense and no great difficulty.

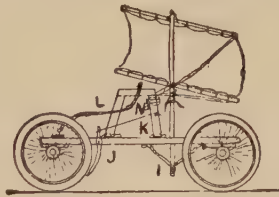
Smooth down with a plane, four pieces of pine, 1 in. thick, 4 in. wide and 4 ft. long, until suitable for legs. Make three cross-pieces, Fig. 1, and join the legs with them as shown in Fig. 2. With an auger bore a hole in each leg about 3 in. from the bottom, and fit into each a little peg, Fig. 2, for the picture to rest on. The peg should be of hardwood so it will not break.

Cut the handle from an old broom, measure off the right length, and put a hinge on one end. Fasten this leg on the second cross-piece, thus forming a support for the two front legs, Fig. 3. The easel may be finished according to the individual taste. It may be sandpapered and stained and varnished, or

How to Make a Wind Propeller

A wind propeller may be constructed with four old bicycle wheels arranged with shafts pretty much like the shafts of a hand-propelled cart. The platform

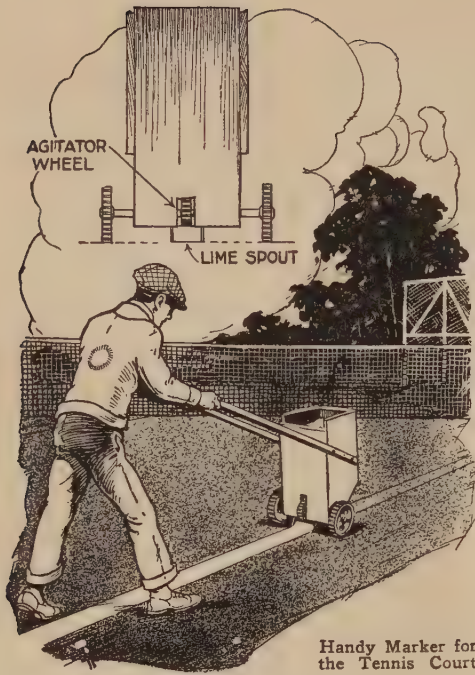
is flatter, however, and the body one tier so that it is lower. A framework of wood is built at M and this is a support



Wind Propeller

for several purposes. The sail is secured to the mast which is fixed into the body of the cart as shown. The sail is linen fabric. There are two cross-pieces to aid in keeping the sail properly opened. The steering arrangement is through the rear shaft. The shaft is pivoted as in a hand-propelled cart, and the rod I extends from the middle connection of the shaft up to a point where the person seated on the wooden frame can handle it. There is a brake arranged by making a looped piece J and hinging it as shown. This piece is metal, fitted with a leather face. The cord K is pulled to press the brake. I marks the support for the mast underneath the body of the cart. In a steady breeze this cart spins nicely along the roads.

Never change a single ball in a bearing. Renew them all.



Handy Marker for the Tennis Court

Improved Tennis Marker

An efficient tennis marker can be made from materials that may be found in the junk pile of almost any garage. The one shown in the illustration was made from an oblong box, with a small shaft for an axle, to which were keyed three timer gears, two large ones for wheels and a smaller one to act as an agitator for the marking material. The small wheel rotates in a groove in the bottom of the box and its gear segments feed the lime out of a tin spout the width of the line to be marked. This device overcomes the greatest difficulty of the sifter type of marker in that it can be filled in a short time.—Maurice E. Miller, Addison, N. Y.

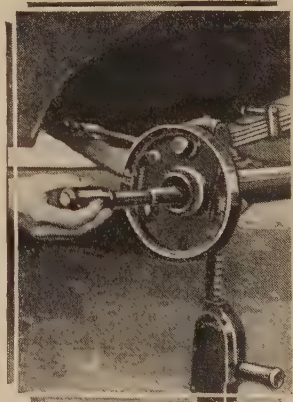
Chain Used as Bottle Cleaner

Cleaning bottles seems to be one of the bugbears of housework. An excellent method is to use a small chain. Tie a string to one end of the chain and then drop the chain in and hold onto the string from the outside. Pour a little water or other cleaning liquid in the bottle, close the opening and shake well. The chain will scrape around and remove all the

sediment. This method will thoroughly clean milk and vinegar bottles, kerosene reservoirs on oil stoves and the like.

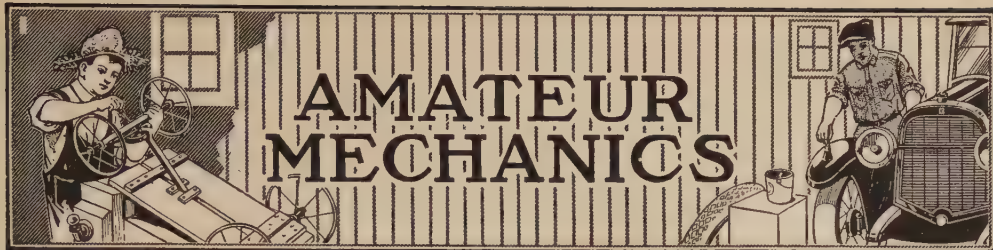
Stopping Rear-Wheel Grease Leaks

When Ford rear wheels leak grease, it usually indicates that there is an excessive amount of lubricant in the differential housing and this should first be determined before attempts are made to stop the leak. If the grease is thin and gritty it should be removed and, in order to do this, it is necessary to draw it out with a grease gun having a long spout, as there are no provisions for draining the differential. The grease should be kept to the level of the filler plug, but if it still continues to leak at the wheels, new felt washers should be put in. The wheel is removed and the outer axle-shaft roller bearing hooked out with a piece of stiff wire. The washers may be jammed far into the axle housing with a long screwdriver or rod, and the bearings replaced together with the customary outer felts. In replacing these, it is a good plan to lubricate them with cup grease, as this prevents friction, which otherwise might destroy them very quickly. However, new washers will not always stop bad leaks. If so, leather washers cut to fit the axle shaft should be used in addition and sometimes will be found quite effective. In



some cases a long piece of heavy wire, twisted around the axle, will stop the leak. It acts like a screw in forcing the grease back into the differential. Probably the most effective method of ending this

annoyance is that of drilling a $\frac{1}{4}$ -in. hole in the bottom of the axle housing, near the innermost end of the outer axle-shaft roller bearing. This admits air into the housing, causing a back pressure, and thus effectively stops the leak.

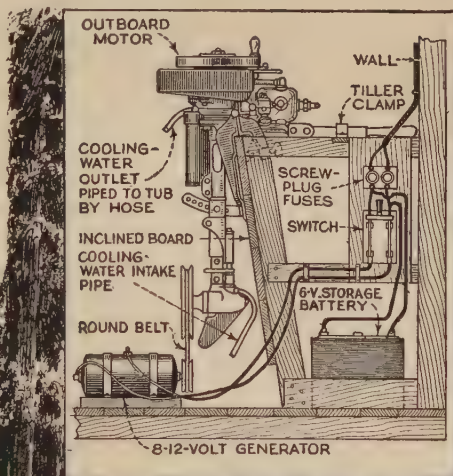


Outboard Motor Lights Camp

By LAWRENCE B. ROBBINS

EVEN small lighting outfits for the boat or the camp cost considerable money—\$150 or upward. Handy as they may be, they are beyond the reach of the average camper, but if one owns an outboard motor for the rowboat it can be used at odd times to charge a low-voltage electric plant which will furnish all the light necessary. In this case it is designed to use one or more 6 to 8-volt lighting storage batteries connected in multiple, to be charged by an automobile generator of sufficient capacity—8 to 12 volts—depending upon the speed. Of course, the ampere-hour capacity of each battery will determine the length of time the lights may be burned, but two batteries of 120 ampere-

hours each should furnish sufficient current so that three or four 32-cp. bulbs could be burned for several hours without running the batteries down very much. Then an hour's charging twice a week



Putting the Outboard Motor to Work When Not in Use in the Boat; the Motor Is Mounted on a Special Frame and Panel and Used to Light the Tent or Summer Cottage

would keep them fully charged. From 17 to 32-cp., 6 to 8-volt bulbs will give good illumination for any average room.

This idea is based upon no particular make of outboard motor as designs vary, and by following the drawing it will be seen that the arrangement is simple and can be adapted to any type of motor with but minor alterations.

First build a wooden panel to support the motor in its normal position. This is constructed, as indicated, of several heavy boards nailed to a framework of 2 by 4-in. timbers fastened securely to a wall.

Bolt two short timbers, parallel with each other and about 3 ft. apart, to the floor. Set them at right angles to the wall. Then to the ends of these bolt two upright timbers, about $3\frac{1}{2}$ ft. long, so they point upward but incline out slightly at the top at about the angle of the stern of a rowboat. Then connect these to the wall with two timbers parallel with each other. When finished, a side view will appear somewhat as in the detail. Use bolts for all fastenings and make sure that the structure is rigid and free from sway or vibration. Nail a wide board across the two parallel timbers on one side for a switchboard.

Now set the motor in position on the panel as shown and clamp it down tight. This should bring the bottom of the propeller about a foot or more from the floor; the farther away the better so long as the motor can be easily cranked. Remove the propeller and substitute a 9 or 10-in. grooved pulley. Make the necessary changes so it will fit on the shaft tight and run true. This may require reboring and keying the hole, if the propeller pulls off the shaft. If the propeller and bevel gear come out of the hub as one piece, it will then be necessary to substitute a duplicate pinion and gear attached to the wheel so as to fit after the manner of the propeller. It is a simple machine job in either case.

Then line up the generator and bolt it to a baseboard, which in turn is bolted to the floor. Key a 3-in. grooved pulley to the shaft of the generator and connect the two pulleys by a strong, round leather belt. If there is not sufficient space under the large pulley the generator can be offset to one side until enough distance is secured to allow good belting distance.

To prevent the motor from turning in its clamp and throwing the pulley out of line it will be necessary to clamp the tiller solidly in position. This can be done by bolting a cross timber across the two top parallel timbers, as indicated, and secur-

ing a flat-iron clamp to the center that will fit down over the tiller handle. Such a clamp can be made of a common strap hinge.

The cooling water for the motor can be taken from a large tub or barrel, or even from a stream or pond if the structure housing the plant is so situated as to allow the latter to be used. In either case it will be necessary to solder a very short hose nipple to the intake of the water pump and another at the outlet. These can be made permanent as they will not hinder the normal running of the engine when in use on the boat. For running the generator, simply couple a piece of garden hose to each nipple and draw and discharge the cooling water at the source.

Set the batteries under the frame and connect to the generator and a switch and cut-out mounted on the switchboard. Then wire from the switch to the main lighting wires of the house. The method of wiring depends to a great extent upon individual taste, and upon the generator. The system may be "hooked up" as in the illustration, although in this case a 12-volt battery or two 6-volt batteries in series should be used. Here the battery "floats on the line," and, when the generator is running, it supplies the lights, the excess current charging the battery as in an automobile. A switch for the battery should be included. When the generator is not running, the switch shown is opened and the battery then supplies the lights. To use again in the boat it is only necessary to remove the hose couplings, release the tiller clamp and substitute the propeller for the flywheel. Then pick up the motor and transfer it to the boat.

Climbing a Tall Smokestack

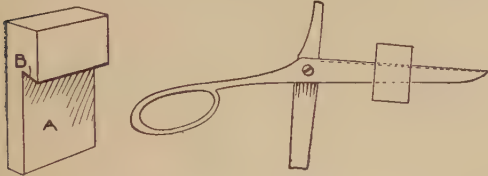
When a huge steel smokestack of a power house needed painting and it was found rather difficult to arrange a tackle to haul up a man, the fireman made a parachute that fitted snugly inside of the stack. He attached a string to the parachute and allowed the draft in the stack to carry it up. As soon as it came out of the stack it fell to the ground and was picked up. A small rope was next tied to the string and pulled up, and finally a rope strong enough to hold the tackle, which was arranged to hoist up the painter.

❑ If a key shears in the axle of the car and there is none at hand to replace it, a serviceable one can be made from the blade of a square-shank screwdriver.

Sharpening Scissors

When sharpening scissors on a grindstone it is very difficult to procure a straight edge. For those not having the facilities of a grinding arrangement a very handy device that will produce a straight and sharp edge can be easily constructed as follows:

Procure a block of wood, $1\frac{1}{2}$ in. long, 1 in. wide and $\frac{1}{2}$ in. thick, and saw a kerf square with the face of the block, as shown at A. Attach a piece

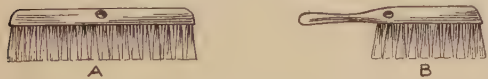


A Block of Wood Fitted with a Piece of Emery Cloth for Sharpening Scissors Correctly

of fine emery cloth in the kerf, at B, with glue, taking care to have it flat on the sloping surface only and allowing no part of the cloth to turn the sharp corner and lie on the back side. Apply the block to the scissor blade as shown and draw it back and forth from one end to the other, being careful to keep the back side of the blade flat against the block. Without being familiar with scissors grinding, anyone can sharpen them correctly with this block.—Contributed by Harriet Kerbaugh, Allentown, Pa.

Counter Brush for a Shop

A very serviceable brush for use around a shop can be made from a discarded or worn-out push broom as shown at A. Pull out the bristles from one-half of the brush and shape the wood of that end with a knife or

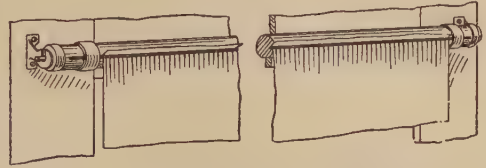


A Discarded Push Broom Shaped to Form a Brush for the Bench or Counter

spokeshave to the form of a handle, and the brush will be formed as shown at B.—Contributed by James T. Gaffney, Chicago.

A Curtain Roller

Procure a window-shade roller, an umbrella rib and two strips of oilcloth, each 1 in. wide and 4 in. long. Cut the

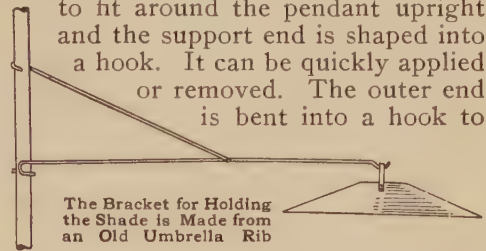


The Curtain is Easily Attached to and Detached from the Roller for Cleaning

roller off so that it will be 6 in. longer than the distance across the window, then cut a groove in it to insert the rib. Sew the pieces of oilcloth so that they will just fit over the ends of the roller. When this is done lay the curtain across the groove, then press the rib and curtain into the groove and push the oilcloth bands over the ends of the rib to keep it in place.—Contributed by E. L. McFarlane, Nashwaakees, N. B.

Shade-Holder Bracket for a Gas Jet

An old umbrella rib makes a very effective shade-holder bracket for a gas jet. The ends of the rib are bent to fit around the pendant upright and the support end is shaped into a hook. It can be quickly applied or removed. The outer end is bent into a hook to



The Bracket for Holding the Shade is Made from an Old Umbrella Rib

hold the shade. The rib can be cut to fit a pendant arm of any length.—Contributed by Edward Keegstra, Paterson, N. J.

To Longer Preserve Cut Flowers

A good way to keep cut flowers fresh is to place a small amount of pure salt of sodium in the water. It is best to procure this salt at a drug store because commercial salt will cause the flowers to wither, due to the impurities in the soda. Call for pure sodium chloride.

Glass Blowing and Forming

Fortunate indeed is the boy who receives a stock of glass tubing, a Bunsen burner, a blowpipe, and some charcoal for a gift, for he has a great deal of fun in store for himself. Glass blowing is a useful art to understand, if the study of either chemistry or physics is to be taken up, because much apparatus can be made at home. And for itself alone, the forming of glass into various shapes has not only a good deal of pleasure in it, but it trains the hands and the eye.

Glass, ordinarily brittle and hard, becomes soft and pliable under heat. When subjected to the action of a flame until dull red, it bends as if made of putty; heated to a bright yellow, it is so soft that it may be blown, pulled, pushed or worked into any shape desired. Hence the necessity for a Bunsen burner, a device preferred to all others for this work, because it gives the hottest flame without soot or dirt. The Bunsen burner, as shown in Fig. 1, is attached to any gas bracket with a rubber tube, but the flame is blue, instead of yellow, as the burner introduces air at its base, which mixes with the gas and so produces an almost perfect combustion, instead of the partial combustion which results in the ordinary yellow flame. All gas stoves have Bunsen burners, and many oil stoves.

If gas is not available, an alcohol lamp with a large wick will do almost as well. The blowpipe, shown in Fig. 2, is merely a tube of brass with the smaller end at right angles to the pipe, and a fine tip to reduce the size of the blast, which is used to direct a small flame. Besides these tools, the glass worker will need some round sticks of charcoal, sharpened like a pencil, as shown in Fig. 3, a file, and several lengths of German glass tubing.

To bend a length of the tubing, let it be assumed for the purpose of making a syphon, it is only necessary to cork one end of the tube and heat it near the top of the Bunsen flame, turning the tubing constantly to make it

heat evenly on all sides, until it is a dull red in color. It will then bend of its own weight if held in one hand, but to allow it to do so is to make a flat place in the bend. The heating should be continued until the red color is quite bright, when the open end of the tube is put in the mouth and a little pressure of air made in the tube by blowing. At the same time, the tube is bent, steadily but gently. The compressed air in the tube prevents it from collapsing during the process.

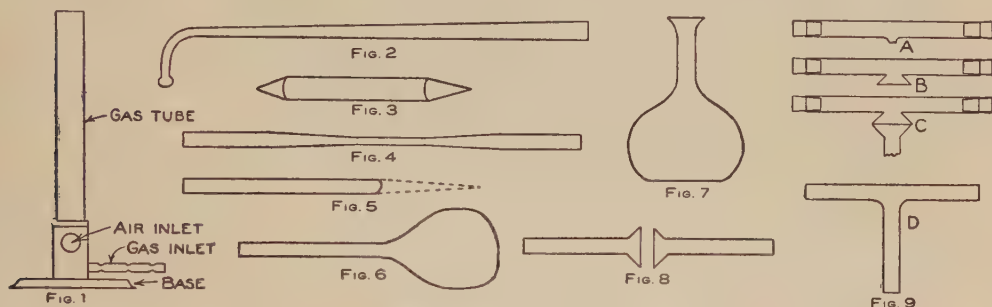
To make a bulb on the end of a tube, one end must be closed. This is easily done by heating as before, and then pulling the tube apart as shown in Fig. 4. The hot glass will draw, just like a piece of taffy, each end tapering to a point. This point on one length is successively heated and pressed toward and into the tube, by means of a piece of charcoal, until the end is not only closed, but as thick as the rest of the tube, as in Fig. 5. An inch or more is now heated white hot, the tube being turned continually to assure even heating and to prevent the hot end from bending down by its own weight. When very hot, a sudden puff into the open end of the tube will expand the hot glass into a bulb, as in Fig. 6. These can be made of considerable size, and, if not too thin, make very good flasks (Fig. 7) for physical experiments. The base of the bulb should be flattened by setting it, still hot, on a flat piece of charcoal, so that it will stand alone.

To weld two lengths of glass tubing together, heat the end of a tube and insert the point of a piece of charcoal in the opening, and twirl it about until the end of the tube has a considerable flare. Do the same to the end of the other tube, which is to be joined to the first, and then, heating both to a dull red, let them touch and press lightly together as in Fig. 8. As soon as they are well in contact, heat the two joined flares together, very hot, and, pulling slightly, the flares will flatten out and the tube be perfectly joined. Tubes

joined without previous flaring have a constricted diameter at the joint.

To make a T-joint in two pieces of tubing, it is necessary to make a hole in the side of one piece, as shown at A in Fig. 9. This is accomplished by the aid of the principle of physics that gases expand when heated. Both ends of the tube, which should be cold, are corked tightly. The whole is then gradually warmed by being held near the flame. When warm, a small flame is directed by the blowpipe from the Bunsen flame to a spot on one side of

attraction, water or other liquid rising in them when they are plunged into it, are made by heating as long a section of tubing as can be handled in the flame—2 in. will be found enough—and, when very hot, giving the ends a sudden vigorous pull apart. The tube pulls out and gets smaller and smaller as it does so, until at last it breaks. But the fine thread of glass so made is really a tube, and not a rod, as might be supposed. This can be demonstrated by blowing through it at a gas flame, or by immersing it in



Glass Blowing and Forming

the closed tube. As it heats, the air within the tube expands and becomes compressed, and as soon as the hot spot on the side of the tube is soft enough, the confined air blows out, pushing the hot glass aside as it does so, leaving a small puncture. This is to be enlarged with pointed charcoal until it also flares as shown at B. This flare is then connected to the flared end of a straight tube, C, and the T-joint, D, is complete.

Using the blowpipe is not difficult. The lips and cheeks should be puffed out with a mouthful of air, which is ample to blow a flame while the lungs are being refilled. In this way, it is possible to use the blowpipe steadily, and not intermittently, as is necessary if the lungs alone are the "bellows."

Small glass funnels, such as are used in many chemical operations, are made by first forming a bulb, then puncturing the bulb at the top, when hot, with a piece of charcoal, and smoothing down or flaring the edges. Very small and fine glass tubes, such as are used in experiments to demonstrate capillary

colored liquid. The solution will be seen to rise some distance within the tube, the amount depending on the diameter of the tube.

The file is for cutting the glass tubing into lengths convenient to handle. It should be a three-cornered file, of medium fineness, and is used simply to nick the glass at the place it is desired to cut it. The two thumbs are then placed beneath the tube, one on each side of the nick, and the tube bent, as if it were plastic, at the same time pulling the hands apart. The tube will break off squarely at the nick, without difficulty.

The entire outfit may be purchased from any dealer in chemical or physical apparatus, or any druggist will order it. Enough tubing to last many days, the Bunsen burner, blowpipe, file and charcoal should not exceed \$2 in cost.

The addition of cadmium to soft solder composed of tin and lead, lowers its melting point and increases its strength.

Tumbling Clown Agitated
by Air Current Caught in
Funnel Forms Novel
Weather Vane



Wind-Driven Tumbling Clown

Quite a novel departure in weather vanes is shown in the drawing. The device consists of a length of 1 by 4-in. wood for a base, a piece of sheet metal cut and painted to represent a circus tent, a small turbine wheel with a figure of a clown attached, and a funnel. A hole is drilled in the center of the base so that it can swing readily on a vertical shaft attached to the top of a post or building. A flange is provided on the shaft to support the vane. The sheet-metal circus tent is attached to one end of the base and the clown and funnel at the other end so that the base will be perfectly balanced when set on the shaft. The turbine is made by tacking a number of tin blades to an ordinary wooden spool and the figure of the clown, which is also cut from sheet metal, is soldered to the edge of these blades. The tur-

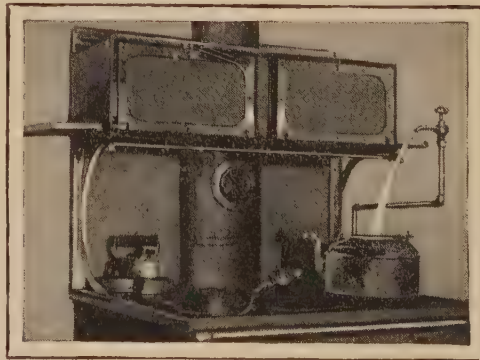
bine is mounted on a short wooden post which is high enough to allow the clown to rotate without touching the base. A strip of tin is attached to the turbine post and is bent to form a windshield on the lower part of the turbine to prevent it from turning in the wrong direction. The funnel is attached in a similar way so that it directs the air on the blades of the turbine just above the windshield and causes the clown to turn back somersaults rapidly.—Lester P. Young, Culver, Ind.

Removing "Frozen" Clincher Tire

It frequently happens that the bead of a clincher tire becomes firmly stuck in the rim due to rust. Place the deflated tire and rim or wheel under the middle of the front axle, mount the jack on the tire, close to the bead, and jack the car up. If necessary, do this at 6-in. intervals around the tire on each side. Before using the rim again apply soapstone powder liberally to prevent future trouble.—J. W. McFarlane, Toronto, Can.

Hot-Water Coil in Range

The faucet shown in the photo is connected to the hot-water coil in the range so that warm water is available immediately after the fire has been started. This feature is of special value when the hot-water tank is upstairs and the water must run through a long pipe to reach the kitchen sink. Another advantage is that large containers, such as wash boilers and tea kettles, can easily be filled since it is only necessary to slide the empty boiler under the faucet. By this means the customary practice of carrying many pails of water from the kitchen sink to the stove is eliminated.



Connecting a Water Faucet to Water Coil in Stove
Gives Hot Water at Once

How to Make a Cruising Catamaran

A launch is much safer than a sailing boat, yet there is not the real sport to be derived from it as in sailing. Herein is given a description of a sailing catamaran especially adapted for those who desire to sail and have a safe craft. The main part of the craft is made from two boats or pontoons with watertight tops, bottoms and sides and fixed at a certain distance apart with a platform on top for the passengers. Such a craft cannot be capsized easily, and, as the pontoons are watertight, it will weather almost any rough water. If the craft is intended for rough waters, care must be taken to make the platform pliable yet stiff and as narrow as convenient to take care of the rocking movements.

This catamaran has been designed to simplify the construction, and, if a larger size than the dimensions shown in Fig. 1 is desired, the pontoons may be made longer by using two boards end to end and putting battens on the inside over the joint. Each pontoon is made of two boards 1 in. thick, 14 in. wide and 16 ft. long, dressed and cut to the shape shown in Fig. 2. Spreaders are cut from 2-in. planks, 10 in. wide and 12 in. long, and placed 6 ft. apart between the board sides and fastened with screws. White lead should be put in the joints before turning in the screws. Cut the ends of the boards so they will fit perfectly and make pointed ends to the pontoons as shown

Turn this shell upside down and lay a board $\frac{1}{2}$ in. thick, 12 in. wide and 16 ft. long on the edges of the sides, mark



Completed Boat

on the under side the outside line of the shell and cut to shape roughly. See that the spreaders and sides fit true all over, then put white lead on the joint and nail with $1\frac{3}{4}$ -in. finishing nails as close as possible without weakening the wood. Slightly stagger the nails in the sides, the 1-in. side boards will allow for this, trim off the sides, turn the box over and paint the joints and

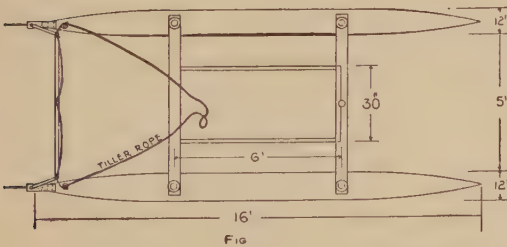


Fig 1

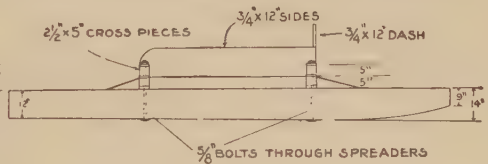


Fig 2



Fig 3

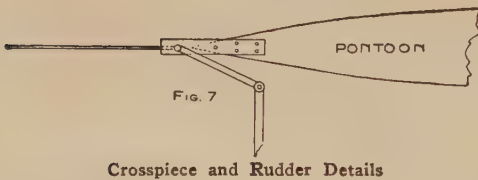
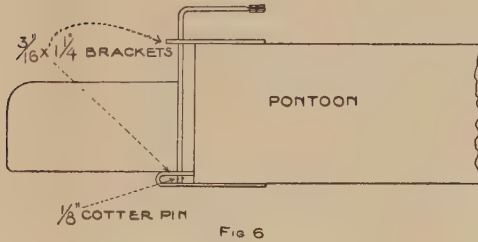
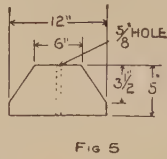
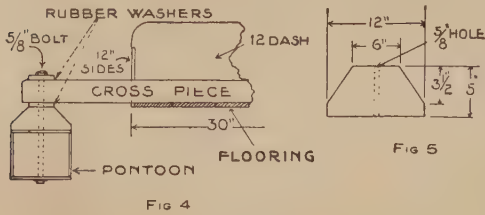
Details of the Pontoons

in Fig. 3, and fit in a wedge shaped piece; white lead the joints and fasten well with screws.

ends of the spreaders, giving them two or three coats and let them dry.

Try each compartment for leaks by

turning water in them one at a time. Bore a $\frac{5}{8}$ -in. hole through each spreader in the center and through the



Crosspiece and Rudder Details

bottom board as shown. The top board, which is $\frac{1}{4}$ -in. thick, 12 in. wide and 16 ft. long, is put on the same as the bottom.

After finishing both pontoons in this way place them parallel. A block of wood is fastened on top of each pontoon and exactly over each spreader on which to bolt the crosspieces as shown in Fig. 4. Each block is cut to the shape and with the dimensions shown in Fig. 5.

The crosspieces are made from hickory or ash and each piece is $2\frac{1}{2}$ in. thick, 5 in. wide and $6\frac{1}{2}$ ft. long. Bore a $\frac{5}{8}$ -in. hole 3 in. from each end through the 5-in. way of the wood. Take maple flooring $\frac{3}{4}$ in. thick, 6 in. wide, $74\frac{1}{2}$ in. long and fasten with large screws and washers to the crosspieces and put battens across every 18 in. Turn the flooring and crosspieces upside down and fasten to the pontoons with long $\frac{5}{8}$ -in. bolts put

through the spreaders. Put a washer on the head of each bolt and run them through from the under side. Place a thick rubber washer under and on top of each crosspiece at the ends as shown in Fig. 4. This will make a rigid yet flexible joint for rough waters. The flooring being placed on the under side of the crosspieces makes it possible to get the sail boom very low. The sides put on and well fastened will greatly assist in stiffening the platform and help it to stand the racking strains. These sides will also keep the water and spray out and much more so if a 12-in. dash is put on in front on top of the crosspiece.

The rudders are made as shown in Fig. 6, by using an iron rod $\frac{5}{8}$ in. in diameter and 2 ft. long for the bearing of each. This rod is split with a hacksaw for 7 in. of its length and a sheet metal plate $\frac{3}{32}$ in. thick, 6 in. wide, and 12 in. long inserted and riveted in the split. This will allow $\frac{3}{4}$ in. of the iron rod to project from the bottom edge of the metal through which a hole is drilled for a cotter pin. The bottom bracket is made from stake iron bent in the shape of a U as shown, the rudder bearing passing through a hole drilled in the upper leg and resting on the lower. Slip the top bracket on and then bend the top end of the bearing rod at an angle as shown in both Figs. 6 and 7. Connect the two bent ends with a crosspiece which has a hole drilled in its center to fasten a rope as shown in Fig. 1.

Attach the mast to the front crosspiece, also bowsprit, bracing them both to the pontoons. A set of sails having about 300 sq. ft. of area will be about right for racing. Two sails, main and fore, of about 175 to 200 sq. ft. will be sufficient for cruising.—Contributed by J. Appleton, Des Moines, Iowa.

Rough alligator finished photograph mounts will not receive a good impression from a die. If a carbon paper is placed on the mounts before making the impression, a good clear imprint will be the result.

Catching Field Rodents

Prairie dogs and squirrels have the habit of suddenly dropping into their holes when somebody approaches. This makes it nearly impossible to get a fair "crack" at them with a gun. It also is quite difficult to trap them, for their holes are almost vertical, and to make a trap effective, it must be set upside down over the hole. An interesting and sure method of catching these rodents is used by a Kansas farm lad, who finds it great sport to spend his vacation days in this way. In a stout cord, about two rods long, a slip-loop is made at one end, and this is carefully laid against the sides of the hole about an inch below the surface. Lying on the ground at the other end of the cord and carefully watching the hole, the boy gives the cord a quick jerk when the animal sticks his head out, and scarcely ever fails to make a catch.

For small gophers, who are too quick to be caught in this way, it is best to use a steel trap. The end of the hole is dug out and the trap set inside so that the animal

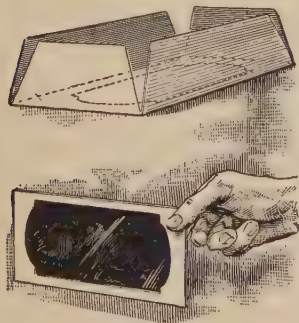


Simple and Effective Method of Catching Field Rodents Provides Great Sport for Farm Lad

has to run over it when trying to get out. After the trap is set, fine dirt should be sprinkled over it until it is concealed. A small board may be used to close the opening above the trap, loose dirt being packed over it until the light is shut out entirely.—H. H. Siegele, Emporia, Kans.

Printing Masks for the Amateur

Printing masks of any size, shape and design can readily be made by the amateur photographer in his spare time and with little or no expense. A sheet of heavy paper, which will permit folding without cracking, but is strong enough to resist tearing,



is folded over to form an envelope for the negative for which it is to be used; it must

be folded accurately to make the negative fit snugly or the latter will have a tendency to slip while printing, which is, of course, undesirable. The design is drawn on the inside of the envelope, which is then laid on a smooth surface, and the central portion carefully cut out, as shown, with a sharp knife or razor blade. The masks should be made to conform to a standard size of negative so that the sensitive paper, which comes in corresponding sizes can be slipped under the negative and printed without trimming.

When it is necessary to drill small holes in hardwood and the correct size of drill is not at hand, an ordinary nail with the head clipped off will be found to be a good substitute. It is inserted in the chuck of the drill in the usual way and will penetrate the work as quickly as a regular bit.

How to Build GOOD SHOOTING BLINDS



by
**Bob
Becker**

the shores. After this comes the necessity of selecting a site according to wind and flyways.

Mallards, pintails, widgeon, teal and shov-

THE art of making blinds, hide-outs or other places of concealment is as old as the sport of hunting. Indian bear hunters of Alaska have, for many decades, constructed blinds along salmon streams from which they could shoot the big brown bears of the north country. South American Indians know the trick of making a hide-out in the low branches of trees from which they can kill the big jaguars, the largest cats in America. In wild-fowl hunting this same art of concealment is practiced, and the successful duck and goose shooter must know something of the craft if he wishes to come home from his hunt with good bag. The warier the birds the more woodcraft skill is needed, and akin to this requirement is that of decoy location, use of an artificial caller and various other tricks of the trade.

In hunting marsh or puddler ducks, birds that like to frequent, and feed in, shallow ponds, lakes or bayous, one of the first rules in blind making is to take advantage of any natural vegetation along

the shores. After this comes the necessity of selecting a site according to wind and flyways. Mallards, pintails, widgeon, teal and shov-
elers are among the commoner marsh ducks which are usually shot from shore blinds with a stand of wooden or live decoys in front of the place of concealment. These birds come into a stretch of water and to decoys, circle and then swing in to light against the wind. In making your blind for a day's or season's shooting on a body of water try to locate it so that you will have the advantage of prevailing winds and get your shooting at birds facing you as they come in against the breeze (see Fig. 1). For example, in many sections of the



FIG. 1

United States the best shooting on waterfowl is had during storms with north and north-west winds blowing, or when a snow flurry and high winds are coming from the east and northeast. If possible, the duck hunter should locate two blinds on the shooting hole so that he can change about when the winds veer. One of the

hide-outs on the bank and at the water's edge should face west or southwest. This blind is for shooting when the wind is in the east or north-

east, as then the birds will swing in to decoys against the wind and facing the hunter. The other blind should be located so that it looks east or southeast.

The site or sites selected, the next step is construction of as "natural-looking" blinds as possible. Ducks, especially mallards and pintails, are quick to size up the appearance of a pond and its surroundings, and if any features look suspicious, away they go. The more they circle, the keener their observations.

A piece of white paper carelessly left on the ground near the blind, weeds, cattails, rushes or other vegetation along the shore cut or disturbed too much, or a slight move on the part of the occupant of the blind, often scare the wary birds so that the hunter is not able to get in a single shot.

If there are no weed patches, cattails, tules or other growth along your duck pond, tall enough for concealment purposes, you should get busy before the hunting season and supplement the natural growth with willow branches stuck



Taking Advantage of Small Shrubs and Shore-Line Vegetation; This Is the Famous "Downton Bob" and His Master, Dean Swift; Note the Hole to the Left of the Dog, Made by Him So He Can Mark Fallen Birds

in the shore, or tall weeds of the same kind as grows along the shore line. This "landscaping" should be done early before the

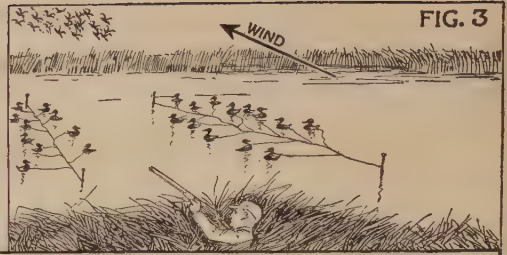
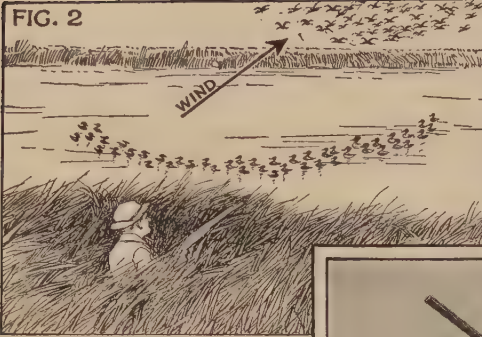


Above, Blind Made of Rushes and Grass Stuck in Chicken Wire; Left, Staking Out a Live-Goose Decoy on a Sandbar



flight begins, so that the birds can get used to it. Be sure to place such a growth also at the point where you intend to make your shooting blind.

If the shore line has a good stand of vegetation, the problem of making a blind is much simpler.



Right, a "Natural" Marsh Blind Made of Standing Rushes at the Edge of the Pond

For a hastily made temporary blind suitable for just a day's shooting, all the tools you will need are a knife and a few pieces of string or old wire. Step into the stand of cattails, weeds, rushes or other growth along the shore and cut out a circle 36 to 48 in. in diameter. As you slash the vegetation, take a handful and tie it together with string and then ram it down in the ground to increase the screen around you. If a few short twigs are handy (you can't always find them in a marsh, however), wedge several around the edge of the blind so that the bundles of weeds can rest against them.

A blind 3 to 4 ft. in diameter is large enough for one person. For two, or one hunter and a retrieving dog, it is a good idea to make them wider, always leaving the vegetation standing at the back of the blind with the exception of a narrow swath through which the hunter can enter. Last fall our permanent duck blinds measured slightly more than 5 ft. in width and about 39 in. in depth with the vegetation sloping inward, as a pitch toward the center furnishes more of a screen for the hunter.



The permanent blind, constructed to last through an entire season of hunting, requires more labor, but even then a good one can be made in the marsh in an hour or two. A band of ordinary chicken wire, 18 to 36 in. wide, three or four roughly made stakes, a few boards, a hammer and sharp knife are the tools and material needed. Locating the blind as close to the water as possible, either in the swamp vegetation, at the edge, or behind a small clump of willows or other shrubs, drive

the stakes in the shape of a half circle, and then add two or three to form the back of the blind, the latter being arranged in a straight line. Bend the wire around these stakes and fasten it with small brads. The wire forms the backbone of the blind; into



and against it the cattails, tules, tall grass, twigs, or other stuff used to make a screen, can be woven. Last fall we had one blind at



Above, Setting Out Decoys on Louisiana Lake; Center, a Rare Type of Blind, Built in a Cypress

the edge of a cornfield which was fringed with weeds 5 ft. tall. To make the hide-out blend into the surroundings, we used both dried cornstalks and weeds, the material being cut from a spot several hun-



in the Middle of Reelfoot Lake, Tenn.; Below, Setting Out Silhouette Goose Decoys

want for a seat, should be placed at the back of the blind. Inasmuch as duck shooting usually means fairly long hours, it is wise to spend considerable time to make the seat as comfortable as possible. There



dred yards from the blind, so as to leave the surroundings of the blind as natural as possible.

And now for the furnishings of the blind. If the ground is muddy (and most sites for blinds are, as they lie close to the water's edge), it is a good idea to make a rough board floor. A small box painted brown, or whatever you



FIG. 5.

is no need to punish oneself on a cold, stormy day while waiting for birds to show up. If you can find an old kitchen chair, saw off the legs to get the height desired, paint it dark-brown and use it for

a seat. The backrest means real comfort in a blind.

Now that the blind is located, you're

ready to set out the decoys. If you have a bunch of wooden decoys be sure to set them out so as to give the flying birds some open water between the wooden "foolers";

single-file arrangement works and saves a lot of trouble. Take a slender iron rod of sufficient length to allow you to stick it into the bottom of the pond and still have



otherwise your ducks will come in, circle and then swing to the set and go down at the outer edge of the decoys.

One of the simplest methods of setting out the wooden blocks is to string half of the bunch to the right, the other half to the left, leaving a wide open "parking spot" between them with just one or two decoys in this spot, as in Fig. 1. With such a layout incoming waterfowl are pretty sure to swing and aim for the open water right in front of the blind. Under no circumstances place any of your decoys beyond gun range, as it doesn't give you any shooting to decoy birds and have them settle down out of gun range.

Another effective arrangement of block decoys is the moon-shaped layout shown in Fig. 2, which leaves an open space to which birds will come.

In handling and placing live decoys in front of a blind, one of the simplest arrangements that a hunter can make, is to string 6 to 12 live birds from an iron stake which is rammed into the mud in the bottom of the pond. While this does not permit the scattering of decoys in front of the blind, a layout which many hunters think is most necessary late in the duck season, when it is bitterly cold and getting one's hands wet is real punishment, this

12 to 18 in. of the rod show above the water. Ram it into the mud about 30 ft. from the blind, after fastening to it a stout cord, at least 30 ft. long. At intervals of every 3 or 4 ft. along this cord, tie on short pieces, 18 to 24 in. long. Make these secure so they won't slip. Sew these on and then tape them so that they cannot move an inch. The next step is to provide the smallest metal snap that you can get for the ends of these short pieces.

The rod is in the water, the long cord with shorter lengths attached is in position, and now you are ready to put out your decoys.

Rowing out in your boat, you pick up a live mallard decoy, and put a patented decoy holder (the kind that can be purchased in any sporting-goods store) around its neck. If the short lengths of cord are not provided with small rings at the end, it is no trick to attach these, as the snap on the short decoy line is to be hooked up with the ring on the holder. Just go down the line hooking on your live birds to the "main line" running from the iron stake. When you come to the end, make a loop in the main line, put it over another iron stake and then ram the stake into the mud. You then have a string of 6, 8, 10 or more decoys all on one

cord, as in Fig. 3, each able to swim around a little and make all the fuss they want. Yet all can be put out or picked up with practically no rowing and when you take the birds in at night you release them by just one snap, leaving the stakes and cord in the water.

In hunting the open-water ducks (the diving birds which feed in deep water), several different tricks in decoys and blinds must be practiced. For example, while live mallard decoys are used in hunting the pond ducks, like mallards, pintails, shovellers, widgeon, etc., in gunning for canvasbacks, bluebills, ring necks, redheads and similar open-water ducks, only wooden decoys are suitable. One of the most ideal sites for your blind for such shooting is on a point separating a bay from the main body of water, especially if flying birds are likely to cut close to this point (see Fig. 4). You need large stands of decoys for these birds, especially on fairly good-sized lakes, as the mass of blocks must be large enough to catch the eye of passing birds. As coots or mudhens are often found by the thousands on such bodies of water and invariably feed with the bluebills and canvasbacks, it is a pretty good idea to get some mudhen decoys and mix them with the canvasback, red-head, and bluebill blocks.

Sandbars and cornfields, these are the two locations usually chosen for a goose hunt. Along big rivers like the Mississippi, thousands of wild geese congregate every fall, using the bars and the adjacent cornfields as their rendezvous. To hunt successfully on a sandbar, which observation has shown is the loafing place for geese, one should make a pit. Last fall we found a small growth of willows on a sandbar which could be turned into a blind, but it was only one of this type to dozens of sand pits along the river bars.

Dig a hole in the sandbar, about 4 ft. deep, 6 ft. long and 4 ft. wide. This pit will be large enough for two gunners. Board up the sides to keep the sand from caving in. Across the top, lay at least two 12-in. planks and one narrower in width. The ideal way to use this pit is as follows: When geese appear, the hunters should sit back deep in the pit, keep out of sight and not move. The operations of the birds can be watched by keeping one's face

near the edge of the planks so as to be looking upward.

Putting out decoys is less intricate in goose shooting than in duck hunting. The majority should be set out down wind with no definite arrangement except that live goose decoys must not be staked out too close to each other. Separate them and they "call" better (see Fig. 5). In typical Mississippi river goose sets, silhouette metal decoys are set all around the pit blind, some even being stuck in the sand at the very edge of the pit. These "birds" are always faced into the wind. When a goose is shot, add it to the set by this trick: Find a small willow stick and ram it into the sand. Then take the dead goose, open its mouth and push the head of the bird upon the twig as if it were trying to swallow the twig. This will give a natural curve to the goose's neck and the posture of the bird resting upon the sand produces a very lifelike effect, much as if the goose were sitting on the sand after feeding.

Coil Spring Saves Windmill Pump

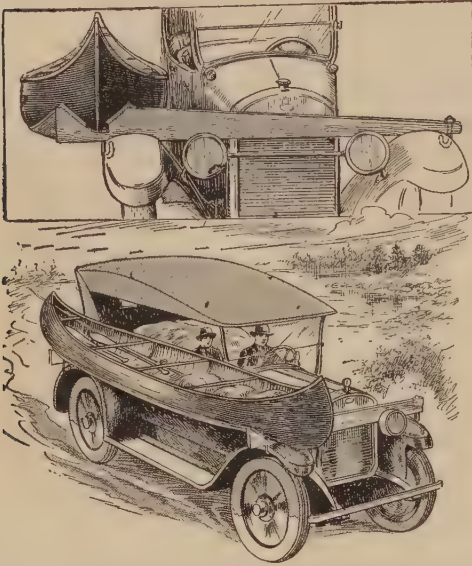


Windmill-operated pumps are usually under a severe strain when a strong wind is blowing, which may cause the bolts to become dislodged or broken from the platform. The pump, then loosened, is lifted up and down with each stroke until the rods, pipe and cylinder are more or less damaged. To avoid this, one farmer devised a simple governor. It consists of a stout coil spring placed between the pump head and the mill connection. The

coil spring, partly compressed, is held permanently onto the pump by means of the bolt through the rod, and exerts a downward pressure which prevents lifting of the pump on the upstroke. It also absorbs the shock of the downstroke and a smooth, noiseless operation results.—G. E. Hendrickson, Argyle, Wis.

Canoe Carried on Touring Car

By the provision of a cradle as shown in the drawing, a canoe can easily be trans-



Wooden Cradle for Supporting Canoe Securely on Side of Touring Car

ported on a car. The cradle consists of two 1-in. planks attached to the car in front and behind, and $\frac{3}{8}$ -in. boards extended from the front to the rear brace. The under edges of these boards are cut to conform to the curvature of the fenders, and felt is glued on to prevent scratching. Special hook-shaped bolts are used to attach these boards, as shown in the upper detail. The fore-and-aft planks form a flexible support for the boat, and are nailed or screwed to the end planks after the canoe has been set in place, so that the latter will have sagged as far as they will go. The canoe is then strapped securely.

How to Make Wooden Decoy Ducks

One can buy decoy ducks or one can make them. For the man who likes to build his own, there are a few points to keep in mind. No matter how artistic you may be, practicability and not art is the essential factor in decoy making. Use wood just heavy enough to float easily without bobbing around. Decoys that move too easily may scare away some socially inclined birds rather than attract

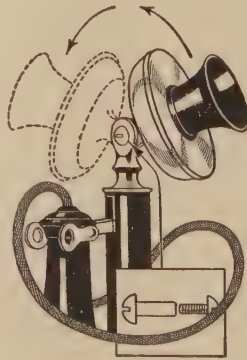
them. On the other hand, don't make the decoy so heavy that it is dead and sluggish. Sensitive birds, such as the black duck or the whistler, are much more easily attracted by a decoy showing some signs of life than by a mere floating object. Load or shape the decoys so that they will not capsize easily and balance them so that the heads will not point up, which gives the impression of a take-off attitude. Flying birds will sense this and pass over instead of alighting. In painting decoys, undercolor them. Use colors ground in japan, with turpentine as a thinner. This gives an absolutely flat color and conforms to nature. Keep out details. Viewed from a hundred yards, any bird shows only bands or splotches of color and that is all that is necessary on a good decoy. Paint the underside gray so that, if the decoy capsizes, it will not frighten the flyers.

Sharpening Sewing-Machine Needles

Often the last sewing-machine needle in the house is dull and does poor work. The difficulty can usually be remedied in a few moments by placing a sheet of medium-grade sandpaper, rough side up, under the needle, and running the needle through it several times. This takes only a few moments and will improve the needle.

Right-Handed Telephone for Deaf

Persons who are left-handed and those who are slightly deaf in the left ear, and are accustomed to hold the telephone receiver to the right ear, will be better able to use the phone if it is made right-handed. The change is accomplished by removing the screw that holds the transmitter to its base. The transmitter can then be turned over so that, when the phone is in the speaking position, the receiver hook will be located on the right-hand side.—J. S. Hagans, Chicago, Ill.

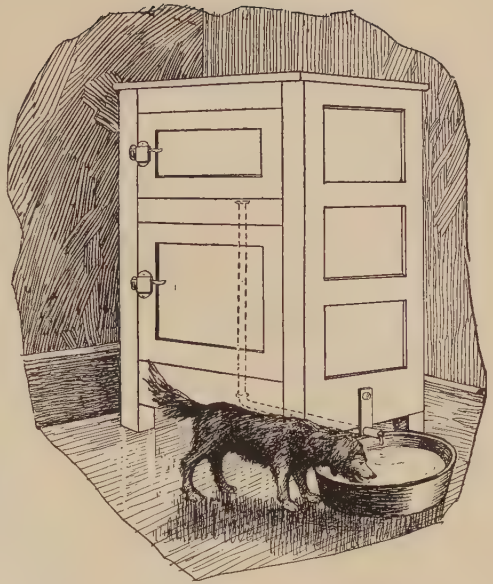
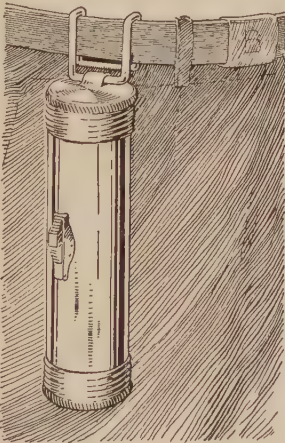


How to Remove Sugar and Starch Spots from Silk Fabrics

It sometimes happens that a silk dress of delicate color becomes soiled with a spot of sugar or starch, and as neither of these can be dissolved or removed with the usual dry-cleaning fluids, it is often considered necessary to send the garment to the cleaner. To avoid this expense and at the same time eliminate the trouble of dipping the entire garment in naphtha or gasoline, use the following method: Place the dress on the ironing board with a pad of absorbent material beneath the spot to be removed. Sponge lightly over and around the soiled spot with gasoline, marking the sugar or starch spot with a pin. Before the gasoline has evaporated, daub the stain with a clean cloth pad moistened with water. The gasoline will prevent the water from penetrating the fibers of the silk but the foreign matter of the spot will be dissolved and driven into the pad beneath. After the work has been completed, allow the fabric to dry as quickly as possible and then brush with a fine bristle brush to restore the luster when the spot is removed. A few drops of vinegar added to the water will cause it to work more quickly on sugar spots.

Flashlight Holder Hooks on Belt

Few flashlights have any means of attaching them to a belt, but a holder for that purpose can readily be made. Two slits are cut in the metal cap of the flashlight and the section between the slits is raised sufficiently to allow the metal ring or hook to be slipped under it, as shown in the illustration, the hook being bent to fit over the belt snugly, so that it will hold the flashlight securely.



Keeping the Drip Pan of a Refrigerator in Sight, to Prevent It from Overflowing

Refrigerator Drip Pan

Drip pans pushed in under a refrigerator will fill up and overflow if not attended to regularly. By placing the pan at one side of the refrigerator, the water level can always be seen and the contents make good drinking water for dogs and cats about the house. The method of altering the drip pipe for such an installation is simple: Before summer commences, set the refrigerator on end and file the inside of the end of the drip pipe clean. Then get a short length of pipe and an elbow that will just fit inside of the drip pipe and solder them together. Arrange a hanger at the side of the box to hold the added pipe at a slight pitch as shown.

Casters for the Kitchen Table

The home craftsman can do his wife a real service by equipping the kitchen table with tea-cart casters. When this is done, the table becomes one of the most helpful articles in the room, for it can be moved about easily from the stove to the sink, to the ice box, or to the entrance of the dining room. The casters have felt or rubber-covered wheels, and consequently will not mar either polished floors or the surface of linoleum.

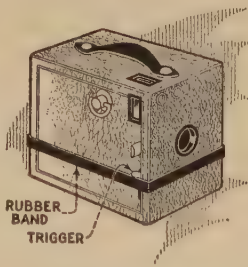
Holding Pail Lid Tight

To hold the lid of a small pail in place so that it will not come off while carrying it, take a length of twine, about 2 ft. long, and pass it through the loop at one end of the bail, draw both ends over the top and tie them to the other end of the bail. Next take a nail and twist the twine to tighten it, as shown in the drawing. When tightened, the nail is left in place to prevent the twine from untwisting again.



Rubber Band Prevents Exposure of Film

While carrying a box or fixed-focus camera in my car, it occasionally happened that the trigger was pushed over and the film exposed, with the result that the photo was ruined. To prevent this, I now snap a rubber band around the camera, as shown in the illustration. This holds the trigger in place securely and prevents it from being pushed over accidentally. When the camera is to be used, the band can readily be removed. —G. E. Hendrickson, Argyle, Wis.



Protecting the Car Finish

Usually the sun does more to damage the high-gloss finish of an auto than rain, although the latter will check it if the varnish is still "green." An auto should never be left unprotected in the sun or exposed to a high wind, because the latter will drive sand and bits of dirt against it and will have about the same effect as a sand-blast

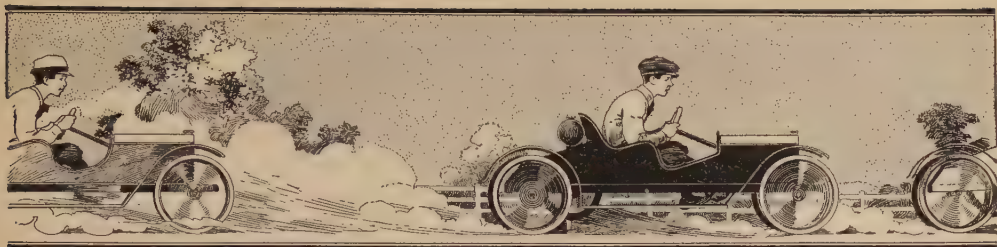
machine. The heat of the sun will, of course, cause cracking and peeling of the varnish. If the car is kept in a garage, all cracks in the structure should be stopped up so that dust will not settle on the car, and it is best to have the floor of the building concreted. It is really better to keep the car in a cool garage than in a warm one. Sudden changes in temperature have a bad effect on the paint and the varnish. Any bare spots noticed should be touched up with paint to prevent rust from spreading, which it will do quickly, and an unpainted bolt head may furnish the start. Motor cars of today have many nicked trimmings and these tarnish as easily as a silverplated spoon, so if the auto owner would have his car always looking nice, he must care for this nickel as a housewife cares for her silverplate. This work is irksome, to say the least, but there is no way of getting out of it unless you give the nickel a coat of vaseline, or some other protective compound. In washing the car, do not use soap containing lye, for the latter will quickly ruin the varnished finish. Alcohol will have the same effect, to some extent, and therefore care should be taken when pouring this liquid into the radiator. If you store the car for any length of time, it is advisable to provide it with a paper cover such as may be purchased from any auto-supply store. Sometimes the work of keeping the car shining may seem a thankless one, but, when the time comes for a trade-in, the owner will find that it pays.

Match Scratcher on Steering Wheel

How many times do you look for a place to scratch a match when driving? It is a simple matter to arrange a suitable scratching spot on the steering wheel, which will scarcely be noticeable and always handy. Cut a strip of emery cloth the width of one spoke of the spider and about



3 in. long. Glue this to the upper surface of the spoke and tie it down until the glue has dried thoroughly.

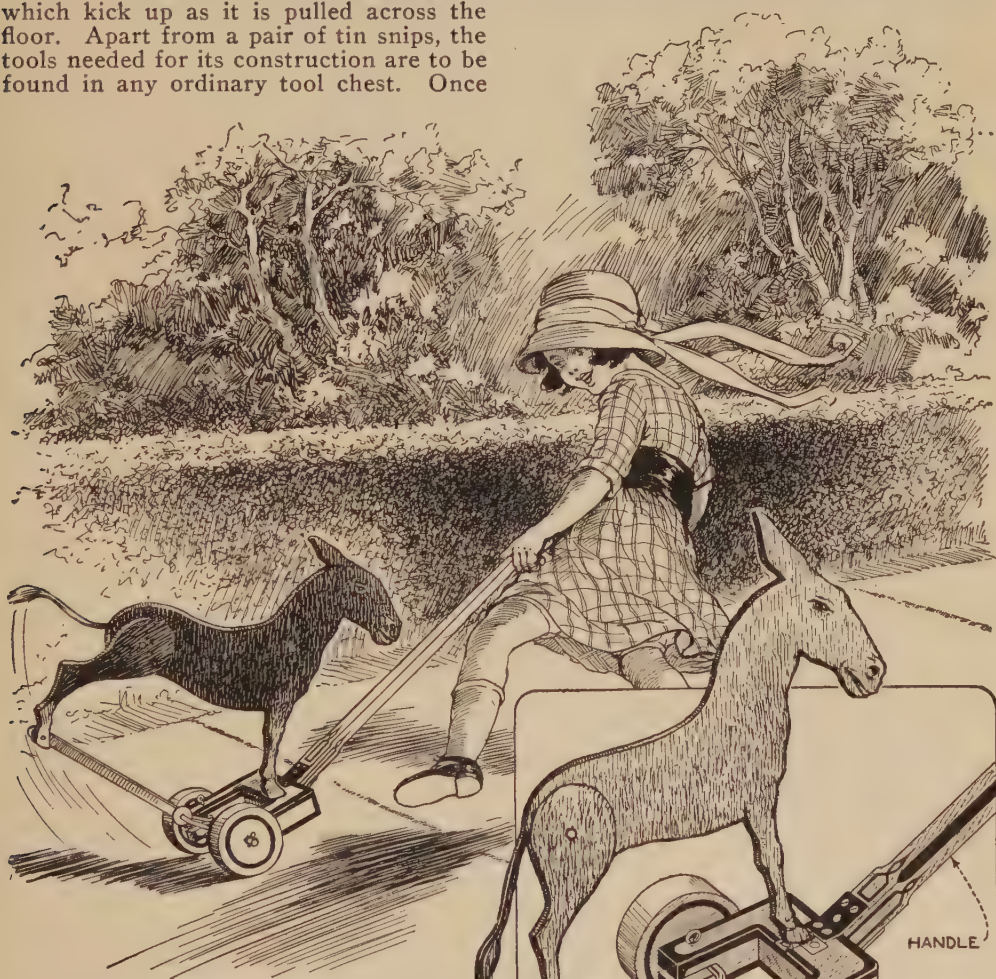


Making a Kicking Mule

By L. R. BUTCHER

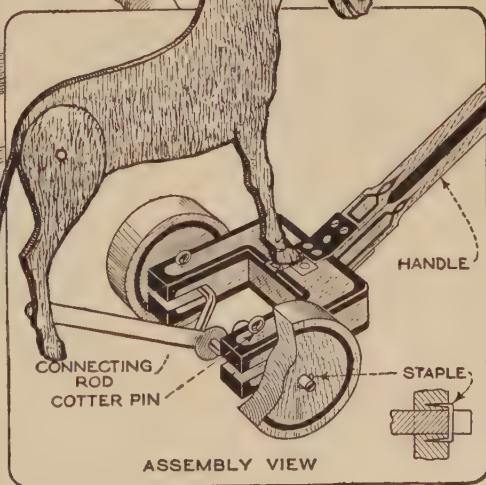
THE kicking mule, as its name indicates, is an animated toy, the rear legs of which kick up as it is pulled across the floor. Apart from a pair of tin snips, the tools needed for its construction are to be found in any ordinary tool chest. Once

is made of medium-weight sheet metal, preferably blue-annealed stock, as this



An Amusing Toy for the Youngsters, Which Can Be Made by Anyone with Ordinary Tools

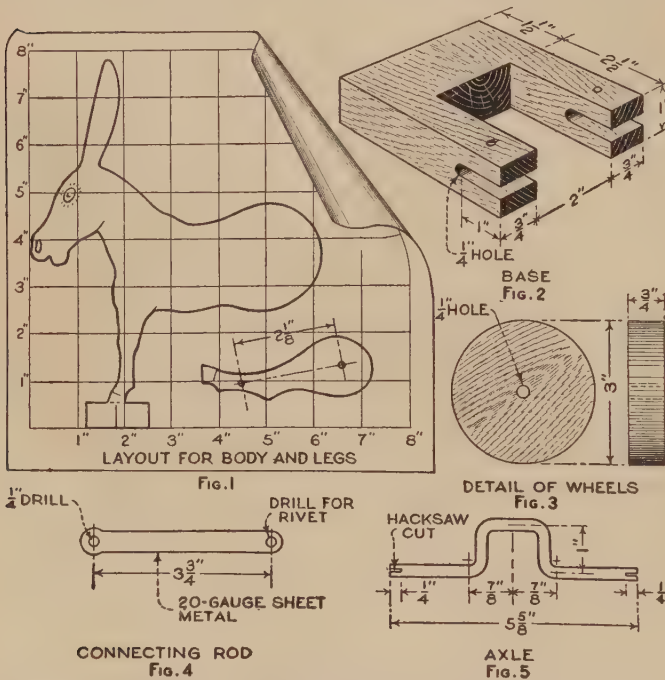
the body is laid out, any tinsmith will cut it out in a few minutes, if the maker does not feel sure of his ability to do it. Scraps of wood and sheet metal furnish the materials for the toy. The body of the mule



holds paint much better than the galvanized kind. In Fig. 1, a sketch of the body is given. By laying out a square on a sheet of paper, 8 by 8 in. in size, and dividing it into 1-in. squares, the amateur artist can easily lay out the body, drawing the outline in Fig. 1 in the same relative position in each square on the pattern. After making the pattern, the outline is transferred

slots in the ends are made with a hacksaw, and are for the purpose of fastening the wheels to the axle. The wheel is slipped onto the axle and a staple inserted in the slot and driven home into the wheel. The wheel is kept from slipping off by squeezing the split end of the axle together, or by putting a drop of solder in the slot.

The connecting rod, Fig. 4, serves to connect the crank on the axle to the rear legs of the mule. One end is drilled to fit the crank, while the other is drilled to fit a small tinners' rivet. Two rear legs are needed. These are pivoted to the body, one on each side, by a tinners' rivet at their upper ends. The connecting rod is placed between them at the hoofs, and pivoted to them with a rivet near the ankles. All the pivot joints should work freely, yet without undue looseness. The handle can be applied in any manner desired, and the toy may be painted according to the maker's notion of what is fitting. Brown does well for the body, with the wheels and base of some contrasting color. A short piece of cord can be glued to the rear of the body, to serve as a tail. Pulling the mule across the floor



Details of Construction of the Kicking Mule, Including a Layout of the Body, to Make It Easy for the Amateur Draftsman

to the sheet metal chosen for the body. As it is almost impossible to follow the sharp curves of the body with the ordinary tin snips, the body should be trimmed to size as closely as possible with them, and the curves filed to the line with a half-round file. The rectangle of metal left on the front hoof of the mule is used to fasten the body to the base. This rectangle is slit up to the bottom of the hoof with the snips, and the two ears thus formed bent in opposite directions, at right angles to the leg. Heavy tacks are used to fasten the bracket to the base.

The base, Fig. 2, requires little explanation. It is made of 1-in. wood, sawed out as indicated. As the axle is bent before it is fitted in the base, the axle holes in the base are slotted out to the rear end, allowing the axle to be inserted from the rear. A cotter pin is used on each side to hold the axle in place. Ordinary 1/4-in. round mild steel is used for the axle, Fig. 5. The

causes the legs to kick in a lifelike manner, once for each revolution of the wheels.

Two Conveniences for the Car

A small article, such as a handkerchief, pad of paper, notebook or the like, is easily lost when it is laid on the front seat of an automobile, as it might then be blown away or drop to the floor unnoticed. To prevent this, sew a band of cloth, about 2 in. wide and hemmed on both edges, cross-wise around the seat cushion in the center, or, in case a cover is used, sew the band directly to this. The ends only are stitched down, so that the articles can be slipped under the band and held there. Another convenience for the motorist is a small pocket sewed to the front of the seat cover. It is kept closed by means of a flap, fastened with two ordinary snaps. This pocket may be used for carrying an extra license plate or a notebook.

Cleaning Rust from Gun

It is usually quite difficult to keep the barrel of a gun free from rust and it is even more difficult to remove the rust after it has once formed. An easy method of doing this is to plug one end of the barrel with a cork and pour some quicksilver into it. The other end is then tightly corked also, and the barrel is tilted alternately on each end, causing the quicksilver to flow back and forth inside. The result will be an absolutely clean barrel.—Sixten N. Swenson, Harris, Minn.

An Umbrella-Rib Bow

The "stout yew bow" of Robin Hood's days is hard to find nowadays, but a bow made of umbrella ribs will give as much delight to the heart of the small boy.

Separate the ribs from the umbrella by cutting the wire that holds them, and remove the short ribs with a file or pliers. Bind five long ribs together at their centers with twine. Then bind three ribs on each end with their inner ends butting at the center of the bundle of five. Next, bind a single rib, eye outward, on each end, with the inner ends at the centers of the bundles of three. The small eyes at the ends of the outer ribs can be used for attaching the bowstring. The middle of the bow should be neatly served



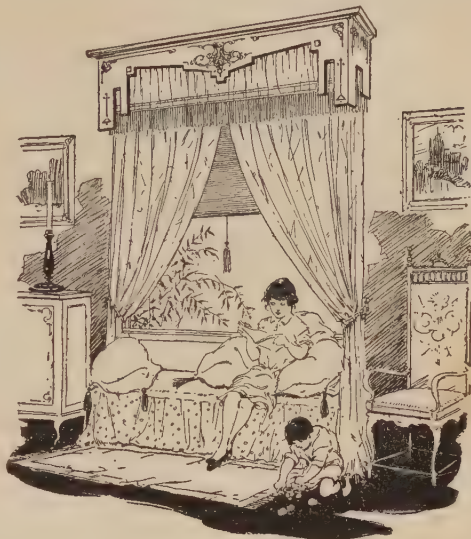
A Good Substitute for the Yew Bow of Tradition Is Made from Umbrella Ribs

or bound with twine, to prevent the ribs from scratching small hands. Any ribs left over make good arrows if nicks for the bowstring are filed in the ends.

☛ Carry a small covered can in the automobile for catching gasoline, for use when making patches and priming the engine.

Ornamental Cover Hides Curtain Top

Ornamental as well as novel in construction and design, a window-curtain covering of the kind shown in the drawing adds a pleasing touch to a Chicago parlor. The



Attractively Painted "Curtain Box" Enhances the Appearance of a Room and Hides Curtain Rods

cover, or "curtain box" as it is called, is made of thin poplar; it is long and wide enough to cover the top of the window frame, curtain and curtain rods, thus hiding this conventional but more or less ugly arrangement. After the cover is finished it is painted and decorated to match the wall paper; in this case it was given two coats of white paint, rubbed down, and then finished with a coat of white enamel. On this scrollwork and flowers were painted, giving a very attractive effect.

Repairing Cracked Aluminum Oil Pans

Cracked water jackets and aluminum oil pans can often be repaired satisfactorily with sulphur. Proceed as follows: First clean all the grease and dirt from the surface, using a solution of hot water and sal soda. Permit the surface to dry thoroughly before applying the sulphur. Warm the surfaces with a blowtorch and melt some of the sulphur in a container, taking care that it does not catch fire. Pour the melted sulphur into the crack and allow it to harden. Small cracks in aluminum are easily mended in this way. The repair will be water and oil-proof, provided fire is not allowed to come in direct contact with the sulphur.

Combining Mail Box and Gatepost

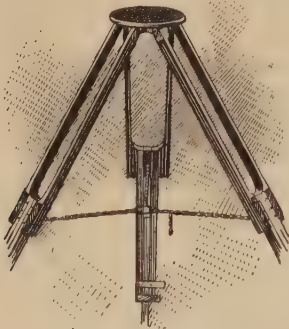


Although efforts are made by road builders to beautify the highways, not much has been done to eliminate the ugly rows of mail boxes mounted on posts. However, a progressive Indiana farmer combined his box with a concrete gatepost as shown in the photo. It is out of the way of small

children who are usually curious to know the contents; it can not be shot full of holes by a disappointed hunter or ambitious marksman, and does not detract from the appearance of the road.—A. S. Bowes, Chicago, Ill.

Safety First for the Tripod

Camera tripods are easily upset by an accidental touch of the foot against the inside of one of the legs, with the result that an expensive camera may be badly damaged and, perhaps, the lens broken. The same tendency to slipping is experienced when setting up the tripod on surfaces where it is impossible to make the



spurs hold. A simple method of preventing this trouble is shown in the illustration. Three 10-in. lengths of furnace chain, a keyring and four snaps are required. Three of the snaps are attached to the ends of the chains and the fourth to the keyring, to make the safety device adjustable. Small screweyes, for attaching the snaps, are driven into the legs of the tripod at the points indicated.—C. E. Weibezahl, Syracuse, N. Y.

Emergency Battery Clips

Galvanized-iron pipe couplings of the $\frac{1}{2}$ -in. size have been found to be excellent connectors for storage-battery posts in the absence of the regular clips used for this purpose. The couplings are screwed on the post, the tapered thread cutting into the lead and thus giving a firm electrical contact. The bared ends of the cable or wire can readily be soldered to the coupling. A little vaseline smeared on the post will prevent corrosion and facilitate the removal of the couplings. This connector will stand heavy currents, will fit almost any battery post and will not damage the posts in any way.

Heating Shoe Patches

Cement-fastened patches are often used to mend shoes. The patch is scarfed to a feather edge; it and the shoe are given two coats of leather cement, the first being allowed to harden before the second is applied. To fasten the patch on the shoe, the cement must be softened again by heat, and to warm both the patch and shoe at the same time is usually an awkward task. By blocking up an electric lamp level with the hole in the shoe, however, and placing the patch on the block on the other side, the cement can be equally softened on both with the assurance that the patch will stick solidly to the shoe when it is applied. A small block of wood is placed inside of the shoe before applying the patch, and the latter is carefully hammered down, especially at the edges.



Preventing Draft in Touring Car

A good method of preventing the entrance of drafts at the vertical joints between motor-car side curtains is to sew a strip of curtain cloth, about 4 in. wide, to the rear edge of the front curtain, so as to overlap the rear curtain on the outside. When running at a moderate speed or when headed against the wind, this flap is pressed firmly against the rear curtain, closing the gaps effectively.—E. T. Gunderson, Humboldt, Ia.

New Sport with "Walking Stick"

Stilts and the "pogo" stick are combined in the device shown in the drawing to provide a new sport for the children. The user mounts the footboard and tips the stick toward the left and right alternately with body movements, turning the handle at the same time so that the action of the device closely resembles walking. The steps are of good length and the operation is not tiresome.

The construction of the device is shown in the insert. The legs are made from a length of $\frac{1}{4}$ -in. flat iron about $1\frac{1}{4}$ in. wide, bent to the shape indicated. A cross brace of the same material is riveted to the legs about halfway between the bottom and top. To this brace a 4-ft. length of $\frac{3}{4}$ -in. gas pipe is riveted, the end of the pipe being slit with a hacksaw and bent, the ears so formed being bent outward, flattened and drilled for the rivets. A footboard, with a hole drilled to fit on the pipe loosely, is slipped over the pipe and rests on a large metal washer placed over the top of the legs. A $\frac{3}{8}$ -in. rod is driven through a hole drilled near the top of the pipe to serve as a handle. The footboard is loose so that the user can operate the device



The "Walking Stick"—a Combination of Stilts and the "Pogo" Stick

without moving his feet but by giving the handle a twisting motion and swaying the body from side to side.

CEbonite and hard-rubber trays can be repaired with a cement made by barely moistening chloride of zinc with water. Sprinkle immediately with oxide of zinc and press the broken parts together.

Portable Barnyard Lantern Stand

On farms not equipped with electric light the use of a lantern is a necessity. In many cases the lantern is hung on a nail



Portable Lantern Stand Proves of Considerable Convenience on the Farm

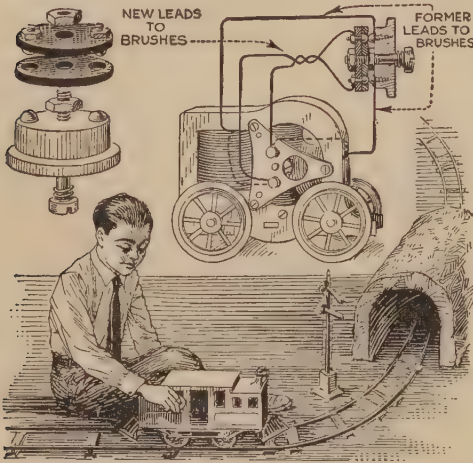
driven into the wall or a near-by post, but this is not handy because the lantern is not always in a convenient location. A portable lantern stand of the kind shown in the drawing has been found very useful as it can be set just where the light is needed. It consists of a 5-ft. length of 1-in. pipe, a piece of $\frac{1}{4}$ -in. iron rod and a discarded harrow disk. The pipe is securely fastened to the disk by means of two nuts as indicated in the detail. The iron rod is bent, as shown, to form an eye at the top for holding the lantern, a wire hook being slipped through the eye for this purpose, and the ends of the rod are then pushed into the open end of the pipe. The whole outfit is light in weight and can be carried around readily.

Storing Table Leaves

It is often a problem, especially in small houses where space is usually very limited, to dispose of extra table leaves when they are not in use. A handy closet can readily be made for them by removing the plaster between two studdings so that the leaves will fit in. This opening is then embellished by providing a casing and a door, made from 1-in. material. A $\frac{1}{16}$ -in. iron rod slipped through two screweyes serves to keep the leaves in place.—T. F. Wait, Santa Ana, Calif.

Reversing Switch for Toy Locomotive

A toy electric locomotive is more interesting to the boy owner if it is reversible, but engines equipped with a reversing

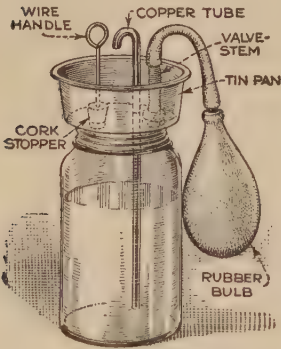


Direction of Toy Locomotive Reversed by Small Switch Which a Boy Can Make

switch cost much more than others. However, a simple reversing switch can readily be made by any boy from a small wooden spool, and two fiber disks of the same diameter. A center hole is first drilled through all three for a bolt with which the switch is attached to the engine. Two small round-head screws are driven into the spool near the edge and directly opposite each other. Two corresponding holes are drilled through each of the disks; those in the upper disk being equal to the diameter of the stem of two small bolts, which are later pushed through as shown, and the holes in the lower disk a trifle larger than the heads. The wires leading to the brushes are then detached and fastened under the heads of the small screws driven into the spool, and two other leads are run from the small bolts in the upper fiber disk back to the brushes. The heads of the bolts touch the heads of the screws and thus permit a constant current to flow. Turning the disks halfway around by means of the head of the central bolt reverses the direction of the current and consequently reverses the direction in which the locomotive is moving.

Safety Container for Cleaning Fluid

It is common practice in tailor shops and pressing establishments to have an open pan of gasoline or other cleaning fluid on the workbench for dipping the cleaning brush; but besides being wasteful, this method is dangerous, and therefore a Wisconsin tailor devised the safety container shown in the drawing. It consists

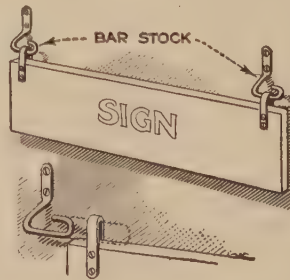


of a fruit jar with a small pan soldered to the cover. Three holes are punched or drilled through the pan and cover; one to receive a bent copper tube, one a stopper with a wire handle, and the third a valve of an old inner tube. The copper tube and valve stem are soldered in the positions shown, the lower end of the tube being about $\frac{1}{2}$ in. above the bottom of the jar. A rubber bulb is attached to the valve by means of a length of rubber tubing. In use, the jar is filled, the cover screwed on

and the bulb is used to force air into the jar, causing the fluid to rise through the copper tube into the pan. When the cleaning work, or spotting, is finished, the stopper is removed, allowing the liquid remaining in the pan to flow back into the jar. The replacement of the cork prevents evaporation and accidental ignition.—G. E. Hendrickson, Argyle, Wis.

Wind-Proof Hanger for Signs

The drawing shows a pair of wind-proof hangers for a sign that has to be changed frequently, such as are used on trains and street cars and in other similar cases. The hangers are made of round bar stock, bent to the shape indicated and screwed in position. The signs are provided with eyes large



enough to slip over the hangers. When once in position the sign will not come off unless a vertical force is applied and this can only be done manually.—A. C. Cole, Chicago, Ill.

Hints on Varnishing

Many amateurs fail in their attempts to do a good job in rubbed-varnish work because they do not take the important factor of temperature into consideration. The best temperature for interior varnishing is from 80 to 85° F., as the varnish will then flow evenly. All doors and windows should be closed tightly so that drafts will not vary the temperature, and also to prevent dust from being deposited on the varnish, which is another cause of poor work. The varnish should be applied sparingly, as too thick a coat will wrinkle upon drying. Vibration of the floor above must be guarded against as it loosens dust particles on the walls and ceilings which will settle on the varnished surface. After one or two coats of varnish are applied and these rubbed down with pumicestone powder and water, a thicker coat is applied and this rubbed down with rottenstone powder and crude oil. The varnish will set quickly when the room is allowed to cool gradually by opening the doors only.—L. H. Georger, Buffalo, N. Y.

Making an Ax Cut Easily



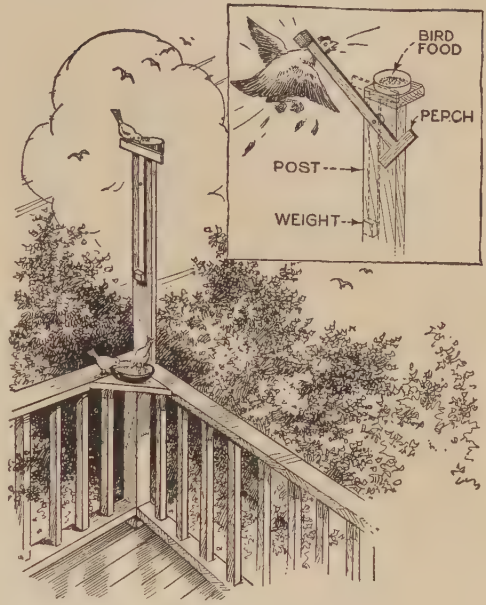
When a series of grooves is ground in the sides, as shown in the illustration, an ax will sink up to the eye in wood with very little effort. This is a simple kink, long kept secret by woodsmen and lumberjacks, who seem to make axes

do most surprising things. The cause of the greater efficiency of the ax is that the surface of the blade is lessened, and consequently the friction reduced correspondingly.—J. T. Garver, Huntingdon, Tenn.

Chicken-Proof Bird Feeder

Many people feed birds by putting grain or bread crumbs on a post. However, if there are any light chickens around, such as leghorns, they can fly up on the post and devour the food. A simple and effective

method of preventing this is to provide a movable perch, pivoted on the post as shown in the drawing. As soon as a



Movable Perch Used to Make Bird-Feeding Post Inaccessible to Chickens

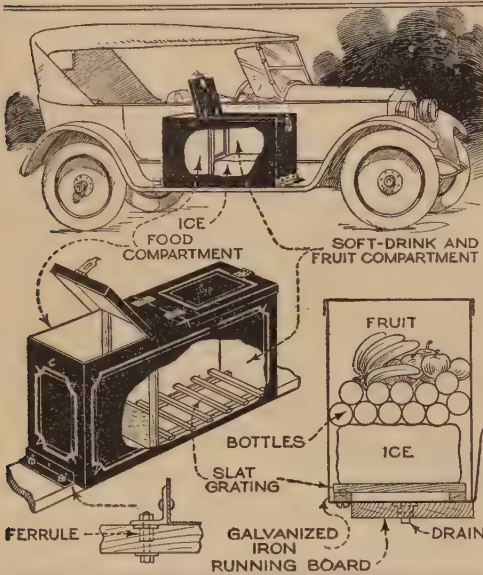
chicken alights on the crosspiece the perch becomes topheavy and turns upside down, the other end, which is suitably weighted, swinging around and striking the chicken "in the neck," which will soon effect a cure without fatal results. On the other hand, the perch will not be upset in this way by the weight of smaller birds. The general method of making such a perch is clearly shown in the drawing, and the point to pivot it varies with the size of the perch and the weight of the wood.—J. F. Hobart, Dunedin, Fla.

Using Broken Chain-Pull Sockets

Electric chain-pull sockets are usually thrown away as soon as the mechanism is sprung or broken, which puts the switch out of order. If the sockets are otherwise in good condition, they can be used without the switch mechanism as plain keyless sockets. In pull sockets one of the lamp-cords is connected to the threaded shell into which the lamp screws and need not be changed; the other is connected to the flat spring which contacts with the center of the lamp by means of the moving parts. The latter are removed and a short insulated wire is soldered to the spring and to the center of the socket.

Detachable Running-Board Ice Box

A detachable running-board ice box of the kind shown in the illustration has been found to be of great value on camping trips. It is made of heavy galvanized iron,



Detachable Ice Box on Running Board Is Useful on Camping Trip

has a compartment for the ice, upon which fruit and soft-drink bottles can be piled, and another compartment for bread, cakes and food that must be kept dry. Two hinged covers are fitted to the top, as indicated, and a slat grating is provided in the bottom to allow easy drainage. The whole arrangement is fastened to the running board by means of four bolts passing through two angle-iron brackets, which are riveted to the ends of the box, and through holes drilled through the running board and bushed with ferrules. The ferrules are turned up out of brass stock and are threaded with a fine-pitch thread so as to permit screwing them into the wood; these have a nicer appearance when the box is detached than plain drilled holes. A drain hole is drilled through the bottom of the ice compartment and through the running board. A $\frac{3}{8}$ -in. nut is soldered in this hole and a screw plug fitted in, a rubber washer being provided under the head.

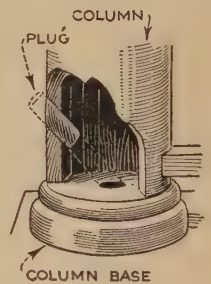
Small Scale Made from Test Tube

A simple and accurate scale for weighing small quantities of chemicals can be made from a glass tube such as develop-

ing powders are sold in, or any ordinary test tube. The bottom is weighted down with fine shot, fixed in place with sealing wax, and a cardboard disk, cut to fit snugly, is fastened over the top with sealing wax also. By immersing the tube in water and weighting it down with small druggists' weights, the proper graduation marks can be made on the tube with the aid of a sharp file.—George Parke, Winter Park, Fla.

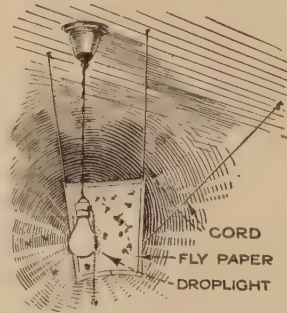
Preventing Columns from Rotting

Porch columns and posts cannot be painted on the underside where they rest on the floor, and as a consequence this end is the first to decay, as water running down the post seeps under it and cannot dry out quickly. This trouble can be overcome and the end protected against decay by drilling a diagonal hole at the base of the column as shown. A half-and-half mixture of linseed oil and turpentine is poured into the hole, and a wooden plug is then driven in to prevent evaporation of the mixture. The result is that the oil penetrates the wood and makes it impervious to moisture.



Catching the "Bugs"

Continually annoyed by insects flying around his electric lights at night, and finding that he could not entirely exclude them from his shop by screens, as some were small enough to pass the mesh, a southern barber suspended a piece of sticky fly paper from the ceiling just behind each droplight. This he



found an effective means of catching the small "bugs." Three lengths of cord were used to hold the paper, one being attached at the bottom to prevent the paper from being blown against the lamp.—L. H. Unglesby, Baton Rouge, La.

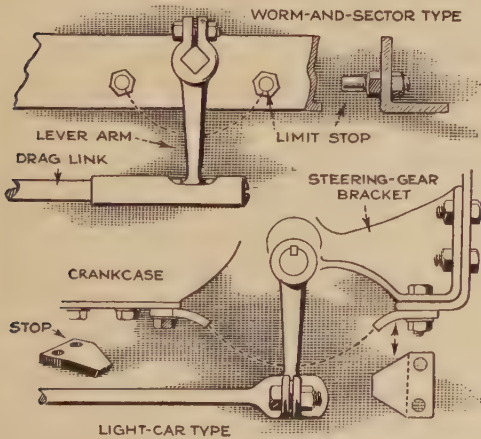
"Killing" Knots

A coating of shellac applied to knots is a well-known measure which is employed universally for preventing knots from showing through painted surfaces. But some knots are so resinous that this common method is not effective, even if several coats of shellac are applied. In such cases it will be found that a small quantity of red lead mixed with the shellac will "kill" the knot and effectively prevent its appearance through the paint.

Avoiding Locking of Steering Gear

In many automobile accidents the cause has been traced to the locking of the steering gear, which may sometimes occur when turning sharp corners and is largely due to wear in the lever arm, drag link and other connecting parts. The danger of having the lever arm lock may be eliminated by either of the two attachments shown in the illustration.

For a worm-and-sector type of steering gear it is usually possible to provide two studs to project from the frame of the car, as shown, to serve as limit stops. In the case of light cars that have the straight-arm type of steering gear, which has the lever arm keyed directly to the steering-post rod, stops are made of $\frac{3}{16}$ -in. steel plate. They are cut in a triangular shape

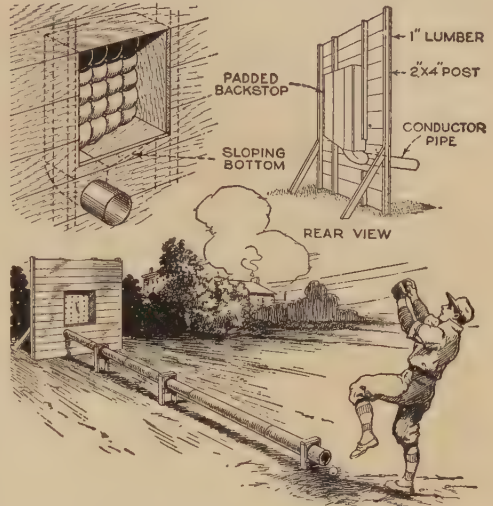


Stops Prevent Steering Gear from Locking by Limiting Its Swing

and are bolted to the underside of the crankcase and the steering-gear bracket, as shown in the lower detail, the ends being bent down a trifle as indicated. It is advisable to bolt up the brackets and measure the throw of the lever before cutting off the ends.

Ball Retriever for Lone Pitcher

The aspiring baseball pitcher is handicapped considerably if forced to practice alone. Bouncing the ball back from the



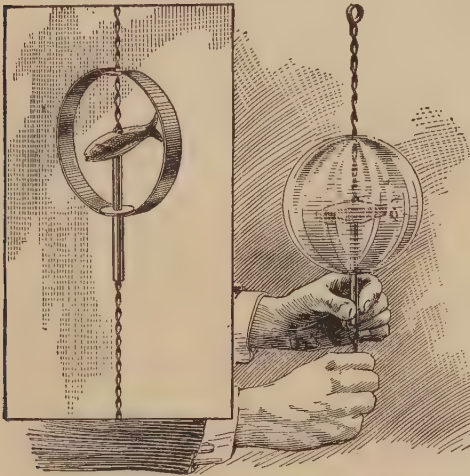
Device for Returning Baseballs to Lone Pitcher and Thus Aiding Him Considerably

side of a building is not satisfactory, and unless an area to show the range of all balls thrown is marked, little is done toward improvement.

The device shown in the drawing was made by a young chap who had no brothers, and no chums near at hand, and was compelled to devise some sort of retrieving apparatus, or walk after the balls after having thrown them. The device consists of a vertical "wall" supported on two posts, with a rectangular opening cut in it. Behind this and slightly larger than the opening is a panel, heavily padded. The panel and wall are joined just below the opening to form a trough, which slopes toward one side. Here a conductor pipe is attached, which runs through the wall and terminates about 30 ft. in front of it at the place where the pitcher stands. Balls thrown through the opening roll through the conductor pipe back to the pitcher. By using two balls he can keep himself busy continually. If the ball fails to enter the opening it will bounce back. But frequent impact against the wood shortens the life of the ball, and if one desires to avoid this, the whole surface of the larger panel may be padded and another collecting trough extended about 1 ft. in front of it, so that all balls will be returned to the point where the pitcher stands.—Dale R. Van Horn, Walton, Neb.

Simple Toy That Provides Optical Illusion

The little toy shown in the drawing produces a convincing optical illusion. It consists of a spiral rod, twisted from thin



This Simple Toy Produces the Illusion of a Fish Swimming in a Globe of Water

brass strip, about $\frac{3}{16}$ in. wide and 1 ft. 4 in. long; on this rod is fitted a flat-brass ring, about 4 in. in diameter, with slots cut in it at top and bottom to fit the brass strip, so that the ring will revolve when it is pushed along the spiral. A tin fish, with a hole drilled through its body to clear the spiral, is held at the center of the ring by means of a sleeve made of brass tubing, the bottom of the sleeve resting on a thin washer, which in turn rests on the ring. Another sleeve of the same material, slipped over the spiral below the ring, completes the toy.

By means of the lower sleeve the ring and fish are pushed up to the top of the rod. When the top has been reached, the lower sleeve is released, and the ring and fish drop down, the former spinning rapidly, while the fish remains still. The effect seen is that of a fish in a globe of water. The faster the ring is pushed up or down, the better the illusion.

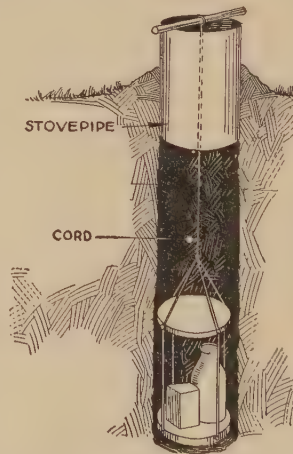
Repairing Worn Babbitt Bearings

Some well-known automobiles use very costly bronze-backed babbitt-lined bearings to carry the crankshaft and the connecting rods. Frequently, it is impossible to adjust these bearings, making it necessary to replace them when worn. However, they can often be repaired in the fol-

lowing way: Clean all grease and oil from the bearings thoroughly, which can be done with a solution of washing soda and hot water. Set the halves of the bearing in such a position that melted babbitt can be poured on the old babbitt surface, which is done until the old surface is completely covered. A soldering iron, already heated to a temperature just above red heat, is then applied to the babbitt to puddle the fresh babbitt into the old, care being taken not to run the babbitt out of the bronze. It is best to puddle it in a small spot at a time so that the babbitt can be controlled. As soon as this has been done and the babbitt allowed time to cool, the surface of the bearing can be scraped down to a proper fit, and the bearing should give just as good service as a new one. A repair of this kind can also be made on a bearing that has been badly scored. It is of great importance to use good babbitt and to make sure that the new and old babbitt are well fused together.—C. F. Worfolk, Royal Oak, Mich.

Iceless Camp Refrigerator

While on a camping trip one member of the party carried a short length of stovepipe, two wooden disks of slightly smaller



diameter than the pipe, and a length of stout twine, with which he made an iceless camp refrigerator for preserving milk and butter. He borrowed a post-hole auger from a neighboring farmer, to drill a hole in the ground. The hole was about four feet deep, and

the length of stovepipe was pushed down into it to prevent the earth at the top from caving in. The pipe was allowed to project above the surface of the ground, and loose soil was banked around it, as indicated. The wooden disks and twine were arranged to form a miniature elevator. The food articles were wrapped up in a paper and put on the lower disk, and the device then lowered into the hole until it nearly reached the bottom. A stick was

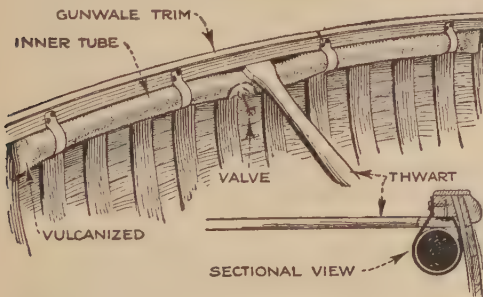
tied to the upper end of the twine and laid across the top of the stovepipe to hold the food suspended in a hole and prevent the end of the twine from being dropped down into the hole accidentally. A piece of canvas thrown over the top of the pipe proved effective in keeping out bugs, and the food was kept in palatable condition.

Hand Pump Made from Auto Oil Pump

When draining a number of lavatories in a summer hotel a hand-suction pump, made from an auto oil pump by simply reversing the washer on the oil pump and attaching a length of rubber tubing to the nozzle, was found of considerable assistance. The hose was inserted into the traps of the lavatories and only a few strokes of the pump were necessary to start a siphon action, which soon emptied the traps. A pump of this kind can also be used for numerous other purposes.—H. Klein, Parkersville, N. Y.

Increasing Buoyancy of a Canoe

An ordinary canoe will, when capsized, sink if the occupants attempt to keep themselves afloat by holding on to it. To make it buoyant even when filled with water is a simple and inexpensive job. Two automobile inner tubes are cut in two and the ends vulcanized shut so that the tubes will hold air without leaking. After inflation to about 4 in. in diameter, the tubes are wrapped with tape for their en-



Inner Tubes Fastened to Gunwale Trim Keep Capsized Canoe Afloat

tire length to confine any weak part that may have bulged out. One tube is then tied under the gunwale on either side of the canoe, in the center, with strips of leather tacked to the gunwale, as shown.

☛An excellent substitute for a rubber mallet is a rubber crutch tip slipped over the head of an ordinary hammer.

Convenient Shingle Holder

A simple and convenient shingle holder can be knocked together in a few moments from a few boards and a wedge-shaped piece of wood. The construction is clearly



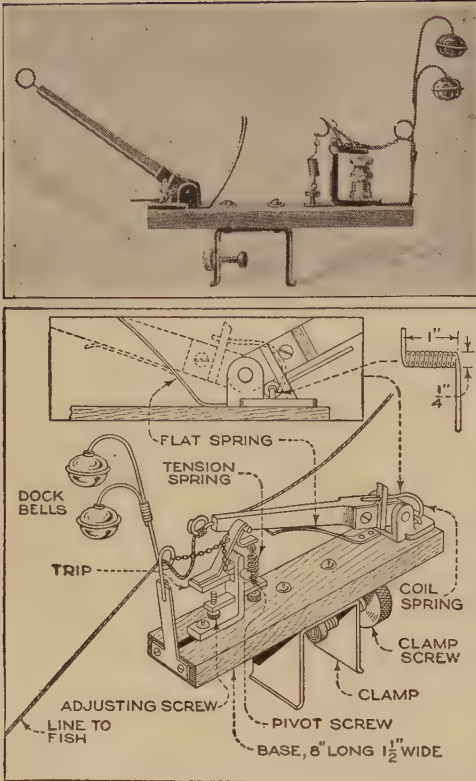
Shingle Holder, Which Is Nailed to Wall or Roof,

shown in the detail. Such a holder is especially convenient when shingling walls, but can also be used on the roof. It is large enough to hold several bundles of shingles. In use, it is attached to the wall or roof by means of 20-penny finishing nails.—L. A. Bull, Seattle, Wash.

Ferrotyping Prints

Prints can be prevented from sticking to ferrotype plates by carefully observing the following instructions: Clean the plate carefully with soap and warm water; rinse and put away to dry. Then sprinkle a few drops of kerosene on the plate and rub the surface until the "bloom" disappears. This is best done with a flannel ball, made by wrapping a square piece of clean flannel around a core of cotton wadding, and tying the flannel corners with a cord.

To prevent air bubbles between the print and ferrotype plate, the latter should be immersed in water and the print applied under the water. Plate and print are then taken out and pressed together. For best results, cooled boiled water should be used, as most of the air in the water is removed by boiling. If the plate is very large, the surface may be flooded with water to avoid the use of large trays.



Novel Fish Trap Sounds an Alarm Every Time a Fish Is Caught

Novel Fish Trap Never Fails

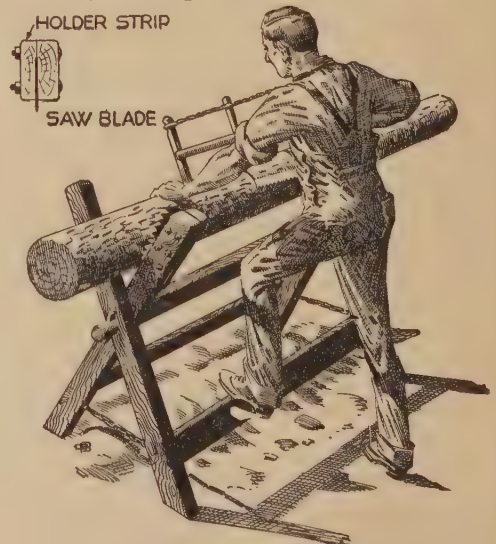
The fish trap shown in the illustration was designed to operate on the order of a spring mousetrap. It has been used for two seasons and has never failed to accomplish its work; when the fish bites, the trap does the rest. It is especially convenient for the fisherman who uses several lines at the same time, as it makes it unnecessary for him to watch the lines constantly, and all he has to do is to release the fish from the hook when the bells indicate that one has been caught.

A block of wood, about 8 in. long, is used as a base. On the underside, a clamp and screw are arranged for fastening it to the edge of a rowboat or dock. A wooden lever is pivoted at one end of this base, and two springs are used to give it a strong thrust when the trap is sprung: a flat one in front to give the initial thrust, and a small coil, of the mousetrap type, behind, to pull it backward and hold it down. The trip should be made for accurate adjustment and can be assembled from the bell-ringing mechanism of an old telephone. It consists of a vertical

piece to which a small crossarm is pivoted. One end of the crossarm is arranged so as to project just over a pin near the end of the lever, to hold it down. The tension of the trip on the pin is adjusted by a small coil spring and screw, to suit weather conditions; if the water is smooth, the trip should hold the pin down very lightly, but if it is rough, the trip should hold it down more securely. The trip is also connected by a chain to a vertical metal arm that is attached to the end of the base, and holds two bells that ring instantly when the arm is jerked. At the same time, when the arm is pulled forward, the chain will tighten and release the trip. The chain should be adjustable so that its length can be varied. The fish line is securely fastened to the ring at the end of the lever, and inserted between the turns of the coil on the flexible arm, just tight enough to allow the line to pull the arm forward for releasing the trip. The entire outfit can be made of odds and ends and does not involve much expense.—F. F. Howe, Milwaukee, Wis.

Sawbuck Holds Cordwood Immovable

Numerous methods are used to prevent cordwood from turning in a sawbuck, but the most satisfactory one I have used is shown in the accompanying drawing. Sections of an old discarded crosscut saw are bolted to the sides of the sawbuck by means of wooden strips, as shown. The teeth of the blades bite into the log and prevent it from turning or rising.—C. M. Wilcox, Torrington, Conn.



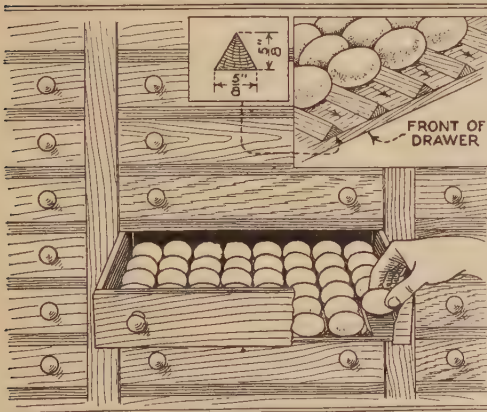
Sections of Saw Blade Fastened to Sawbuck Prevent Wood from Turning

Removing Developer Stains

The amateur photographer who does his own printing and developing frequently finds his fingers and nails becoming deeply stained, especially if he uses a pyro developer for films and plates. A formula for a hand wash that will remove these stains is as follows: Potassium cyanide, 70 gr.; iodine, 50 gr.; water 16 oz. After using this solution the hands should be washed thoroughly, as the cyanide is poisonous.—R. Melrose, St. John, N. B.

Compact Egg-Hatching Cabinet

In the incubator room on a Nebraska poultry farm, storage space for eggs to be hatched was very limited and therefore a compact cabinet consisting of several drawers was built along one side. The drawers were made 32 in. wide, 24 in. long and $3\frac{1}{2}$ in. deep, and were subdivided by means of triangular strips of wood, measuring $\frac{5}{8}$ in. on each side. These were tacked across the bottom of the drawers, as shown, and spaced just far enough apart to hold the eggs side by side. To prevent the eggs from rolling back and forth when the drawer is opened or closed, a small block of wood was set behind the last egg in each row. This arrangement permitted the eggs to be turned over every day by simply pulling the drawers far enough out so that they dropped downward in front, and placing the first egg in each row behind the last one, which caused the others to roll over of themselves. Thus, instead of turning over all the eggs by hand, only

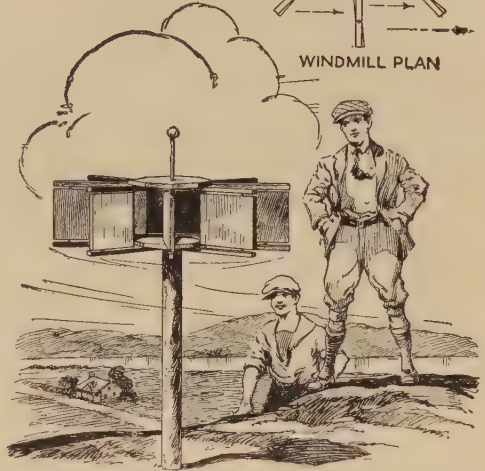
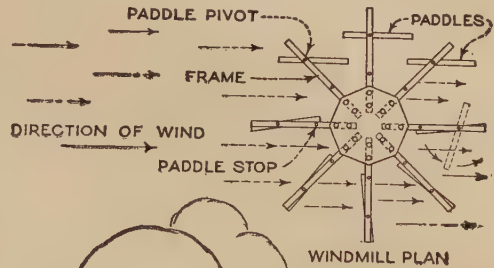


Simple and Compact Cabinet of Drawers Stores Many Eggs in Small Space

comparatively few had to be handled, saving much time.—Dale R. Van Horn, Walton, Neb.

Novel Toy Windmill

The drawing shows a novel and attractive toy windmill that can easily be made by any boy who is handy with tools. This



Novel Toy Windmill Turns, No Matter in Which Direction the Wind Blows

windmill differs from others in that it will revolve no matter in which direction the wind is blowing. It consists of a wooden frame and eight paddles or blades, the whole being pivoted on a post to turn easily. The plan of construction is shown in the upper detail. The frame consists of two eight-sided pieces of wood of the same size, each having eight square wooden spokes screwed to it, equally spaced apart. The paddles are square pieces of wood pivoted between the spokes of the upper and lower sections of the frame. The pivots are located off center in the paddle at directly opposite points in the upper and lower edge, and, of course, alike in all the paddles. Stop pins are also provided to prevent the paddles from swinging around entirely. These points are all indicated in the detail, which should be followed carefully to assure successful operation of the windmill. The paddles must, of course, be free to turn in the slightest wind.

☛ Turpentine will restore most of the original whiteness of discolored ivory.

Inner Tube Runs Toy Engine

Using air pressure instead of steam in a toy engine will run it at a far greater speed than is possible with steam. The



Old Inner Tube Used as an Air-Pressure Tank for Running Miniature Steam Engine

air-pressure tank is a piece of old inner tubing, about 14 in. long, with the ends tied with cord or cemented together, although a vulcanizing job is preferable. An air valve is provided, the core being removed so that the air can escape freely into a rubber tube connected to the steam engine. It would be better to have two valves, one with a core, which is used when the tube is pumped up, and the other without a core. It is also advisable to provide a pinchcock for the tube leading to the engine, so that the air can be shut off when desired. The rubber tank is pumped to about twice its normal size and will then run the engine for several minutes at considerable speed.

Gasket for Old-Type Muffler Head

The exhaust pipe on the older model Fords slips into the front end of the muffler. Much smoking usually occurs at this point, and unless a good floor mat is in place, the fumes get into the car. This trouble can be prevented by using copper-asbestos ring gaskets, which are forced into the muffler head ahead of the ex-

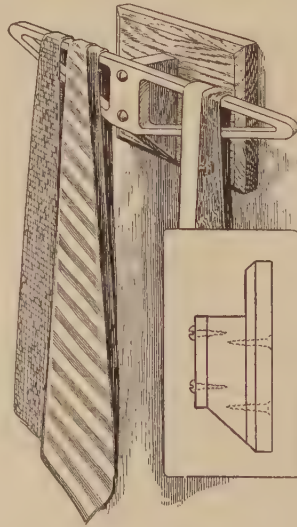
haust-pipe end. The ring gaskets for the manifolds on the cylinder block are the right size to slip neatly into the muffler-head opening, but are rather thin and narrow for best results; several of them have to be used to be effective. A carburetor-flange gasket, if trimmed down and forced into the muffler head by the exhaust pipe, is better.—E. T. Gunderson, Humboldt, Iowa.

Moving an Auto on Ice

An automobile, which was stalled on a stretch of icy road, because only one wheel had traction and the other spun freely due to the differential action, was moved by simply loosening the brake rod to the wheel on solid ground. By setting the brake on the other wheel to hold it tight, it was forced to slide on the ice while the wheel which was free furnished the driving power. If it is difficult to get at the brake rod, the wheel on the ice can be tied to the frame with a rope or skid chain, with the same result.—Harold E. Benson, Boulder, Colo.

Necktie Rack Easily Made

In the design and construction of the necktie rack shown in the illustration an effort was made to produce an article of



good appearance combined with simplicity and utility. The base is made from a piece of cypress, $\frac{3}{4}$ by 5 by 8 in. in size, carefully squared and beveled. The post is a piece of 1-in. material, 4 in. long and 1 in. wide, tapered, commencing $1\frac{1}{2}$ in. from the bottom, and fastened to the base with two No. 6, $1\frac{1}{2}$ -in. flat-head screws. The toe is placed with the end at the edge of the bevel on the base. The bar is $\frac{1}{2}$ by $2\frac{1}{2}$ by 16 in. in dimensions and made of cypress or white pine. It is not necessary to cut the open-

ings in it, but this is easily done with a coping saw and adds greatly to the appearance of the rack. The bar is fastened to the post with two No. 6 1-in. round-head screws, and care should be taken that it is kept parallel to the top of the base. When carefully sanded, stained and waxed or varnished, the rack will not disfigure the bedroom.

First Aid to Frozen Plants

In spite of all precautions plants sometimes freeze accidentally. The following first-aid tip has saved several. Sprinkle the plant liberally with cold water. Then, after half an hour, let warm air enter the room gradually, but under no conditions should the plant be brought into a heated room. The whole process of revival should be spread over a period of one to two hours.—Stanley H. Phillips, Drummondville, Can.

Making Old Pump Sanitary

In smaller towns and on farms there are scores of wells and pumps provided with drinking cups for general use. This is a real menace to the health of the community. A better method is shown in the drawing. Any pump can be converted into a sanitary drinking fountain by simply drilling a $\frac{5}{16}$ or $\frac{3}{8}$ -in. hole in the top of the spout. When drinking, pump slowly to avoid splashing, hold one hand under



Converting the Ordinary Pump into a Sanitary Drinking Fountain

the end of the spout as indicated and the water will bubble up out of the hole.—Leslie G. Roller, Cedar Rapids, Iowa.

Removing Icicles from Flat Roofs

Icicles hanging from flat-roofed buildings are dangerous in windy or thawing weather. One of them, dropping several stories may mean a death to someone below. With this dan-



Simple Device Is Pushed along a Flat Roof to Remove Icicles

ger in mind, a house owner made the scraper shown in the accompanying drawing. It is made of 1 by 3-in. lumber and is pushed along the roof as indicated so that the part extending underneath the eave will knock off the icicles.—L. B. Robbins, Harwich, Mass.

Correcting Typed Papers

One of the greatest timesavers in my work as law stenographer is the following little trick for making corrections on legal papers that have already been stapled and provided with a manuscript back. Insert a sheet of paper in the typewriter in the ordinary manner. Then insert the bottom of the sheet on which you wish to make the correction between the sheet of paper already in the machine and the platen—that is, back of the paper in the machine—and roll the platen backward. This throws out the blank sheet of paper, and it is a matter of a moment to adjust the typed sheet so as to make the necessary correction. This saves the annoyance of taking the stapled sheets apart, as well as the chance of ruining the cover in doing so.—Rose R. Gilgan, Boise, Idaho.

¶ When a three-cell flashlight battery becomes too weak to use, remove the lamp and substitute a two-cell lamp of the same shape and size. The cells can then be used and the lamp will give good light.

Irrigating with Tomato Cans

The following is an easy and effective way to start plants in dry weather: Sink an ordinary tomato can, with a



$\frac{1}{8}$ -in. hole $\frac{1}{2}$ in. from the bottom, in the ground so that the hole will be near the roots of the plant. Tamp the dirt around both plant and can, and fill the latter with water.

Keep the can filled until the plant is out of danger.—Contributed by L. L. Schweiger, Kansas City, Mo.

Fountain for an Ordinary Pen

Take two steel pens, not the straight kind, and place them together, one above the other, in the penholder.

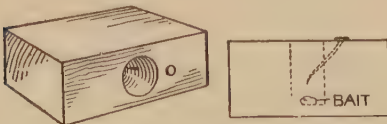


Two Pens in Holder

With one dip of ink 60 or 70 words may be written. This saves time and the arrangement also prevents the ink from dropping off the pen.—Contributed by L. M. Lytle, Kerrmoor, Pa.

Homemade Mousetrap

Bore a 1-in. hole, about 2 in. deep, in a block of wood and drive a small nail with a sharp point at an angle so it will project into the hole about half way between the top and bottom, and in the center of the hole, as shown.



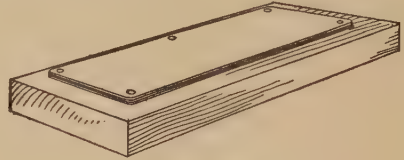
Hole in Wood Block

File the end very sharp and bend it down so that when the mouse pushes its head past it in trying to get the

bait at the bottom of the hole, the sharp point will catch it when it tries to back out. Almost anyone can make this trap in a short time, and it will catch the mice as surely as a more elaborate trap.

Clear Wax Impressions from Seals

A die must be slightly damp to make clear impressions on sealing wax and to keep it from sticking to the wax. A very handy way to moisten the die is to use a pad made by tacking two pieces of blotting paper and one of

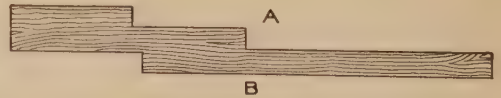


Blotter Pad

cloth to a wooden block of suitable size, and saturate the blotters with water before using. Stamp the die on the pad and then on the hot wax. The result will be a clear, readable impression.—Contributed by Fred Schumacher, Brooklyn, N. Y.

A Window Stick

Although the windows in factories and houses are usually provided with weights, yet the stick shown in the sketch will be found very handy in case all of the windows are not so equipped. It is made of a piece of pine wood long



Notches in Stick

enough to hold the lower sash at a height even with the bottom of the upper, and about $1\frac{1}{2}$ or 2 in. wide. Notches may be cut in the stick as shown, each being wide enough to firmly hold the sash. Thus, with the stick illustrated, the sash may be held at three different heights on the side A, and at still another on the side B.—Contributed by Katharine D. Morse, Syracuse, N. Y.

How to Make a Canoe

A practical and serviceable canoe, one that is inexpensive, can be built by any boy, who can wield hammer and saw, by closely following the instructions and drawings, given in this article.

It is well to study these carefully before beginning the actual work. Thus an understanding will be gained of how the parts fit together, and of the way to proceed with the work.

Dimensioned drawings of the canoe and molds are contained in Fig. 1. The boat is built on a temporary base, A, Fig. 2, which is a board, 14 ft. 1 in. long, 3 in. wide and $1\frac{1}{2}$ in. thick. This base is fastened to the trestles and divided into four sections, the sections on each side of the center being 4 ft. long.

The next thing to be considered are the molds (Fig. 3). These are made of 1-in. material. Scrap pieces may be found that can be used for these molds. The dimensions given in Fig. 1 are for one-half of each form as shown in Fig. 3, under their respective letters. The molds are then temporarily attached to the base on the division lines.

Proceed to make the curved ends as shown in Fig. 4. Two pieces of

from a carriage or blacksmith's shop. The pieces are bent by wrapping a piece of wire around the upper end and baseboard. The joint between the curved piece and the base is tempo-

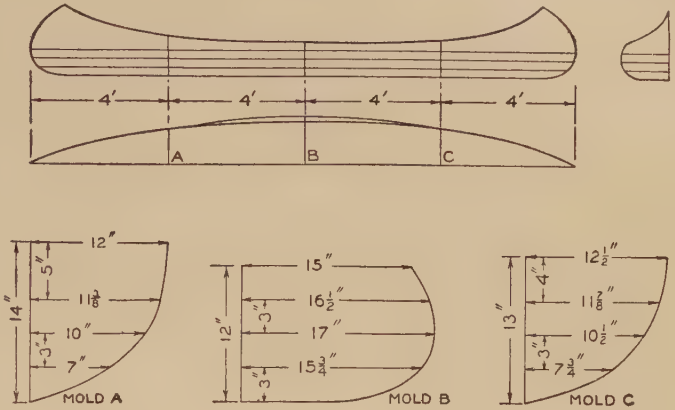


FIG. 1

Canoe and Molds Details

rary. Place a stick between the wires and twist them until the required shape is secured. If the wood does not bend readily, soak it in boiling water. The vertical height and the horizontal length of this bend are shown in Fig. 4. The twisted wire will give the right curve and hold the wood in shape until it is dry.

The gunwales are the long pieces B, Fig. 2, at the top of the canoe. These are made of strips of ash, 15 ft. long, 1 in. wide and 1 in. thick. Fasten them temporarily to the molds, taking care to have them snugly fit the notches

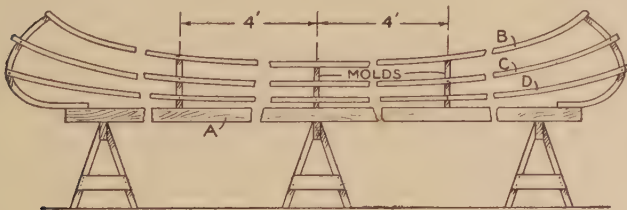


FIG. 2

Shaping the Canoe

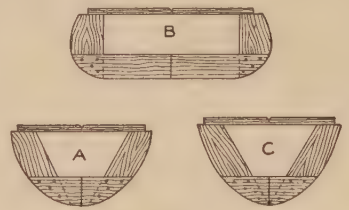


FIG. 3

straight-grained green elm, 32 in. long, $1\frac{3}{4}$ in. wide and 1 in. thick, will be required. The elm can be obtained

shown. The ends fit over the outside of the stem and stern pieces and are cut to form a sharp point, as shown

oil. The inside is coated with spar varnish to give it a wood color.

The paddles may be made up in two ways, single or double. The double paddle has a hickory pole, 7 ft. long and 2 in. in diameter, for its center part. The paddle is made as shown in Fig. 10, of ash or cypress. It is 12 in. long, and 8 in. wide at the widest part. The paddle end fits into a notch cut in the end of the pole (Fig. 11).

Thorns Used as Needles on a Phonograph

Very sharp thorns can be used successfully as phonograph needles. These substitutes will reproduce sound very clearly and with beautiful tone. The harsh scratching of the ordinary needle is reduced to a minimum, and the thorn is not injurious to the record.

Tool Hangers

A tool rack that is serviceable for almost any kind of a tool may be made by placing rows of different-size screw eyes on a wall close to the workbench, so that files, chisels, pliers and other tools, and the handles of hammers can be slipped through the eyes.



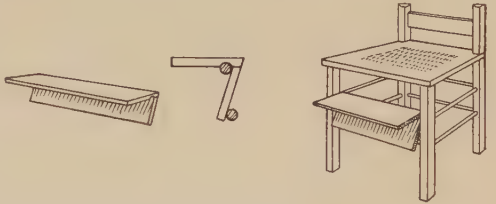
A place for every tool saves time, and besides, when the tools are hung up separately, they are less likely to be damaged, than when kept together on the workbench.

Child's Footrest on an Ordinary Chair

Small chairs are enjoyed very much by children for the reason that they can rest their feet on the floor. In many households there are no small chairs for the youngsters, and they have to use larger ones. Two things result, the child's legs become tired

A shield is made of a piece of tin or rubber and placed around the pole near the paddle to prevent the water from running to the center as the pole is tipped from side to side. The complete paddle is shown in Fig. 12. A single paddle is made as shown in Fig. 13. This is made of ash or any other tough wood. The dimensions given in the sketch are sufficient without a description.

from dangling unsupported or by trying to support them on the stretchers, and the finish on the chair is apt to

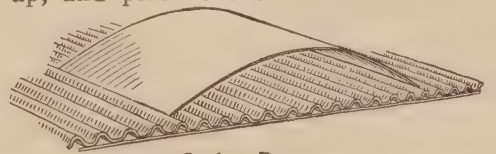


Footrest on Chair

be scratched. The device shown in the sketch forms a footrest or step that can be placed on any chair. It can be put on or taken off in a moment. Two suitable pieces of wood are nailed together at an angle and a small notch cut out, as shown, to fit the chair stretcher.

Drying Photo Postal Cards

A novel idea for drying photo postal cards comes from a French magazine. The drying of the cards takes a long time on account of their thickness, but may be hastened by using corrugated paper for packing bottles as a drying stand. Curve the cards, printed side up, and place the ends between two

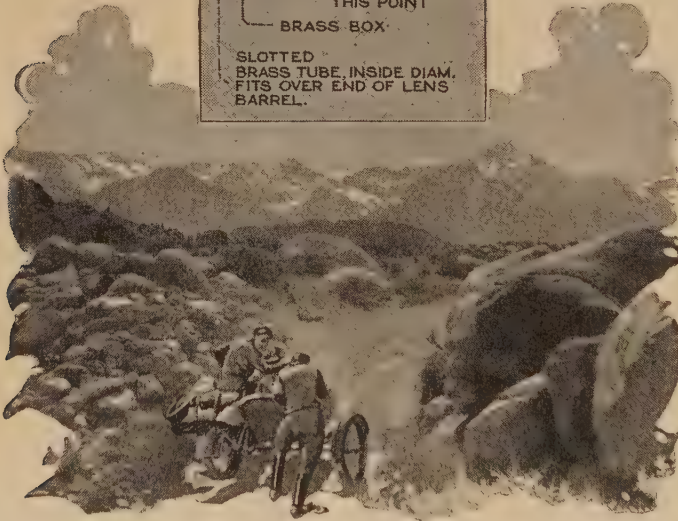
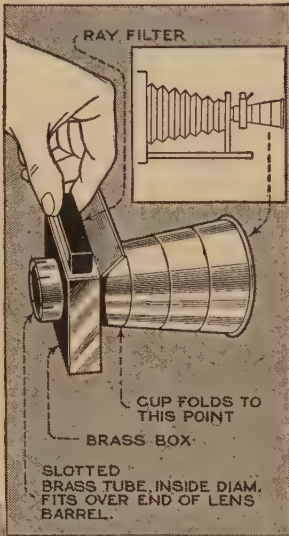


Card on Dryer

corrugations at a convenient distance apart. They will thus be held firmly while the air can circulate freely all around them.

Lens Shade and Ray-Filter Holder

Nearly every photographer knows that some exceptionally attractive pictures can be made by "back-light" effects, which are produced by taking the pictures against the light. In such cases it is, of course, necessary to provide a shade over the lens in order to protect the film or plate from over-exposure. Many photographers



"Back-Light" Photo Taken with the Aid of a Lens Shade, Which Can Be Combined with a Ray-Filter Holder, and Is Slipped over the Lens When Used

attempt to take back-light photos by shading the lens with a plate slide or with their hats, with the result that the picture is partly ruined by the slide or hat appearing on the negative, all out of focus and cutting off part of the view. A lens shade, which is adaptable to all kinds of cameras, is light in weight and has a ray-filter holder attached so that the operator can use both filter and shade at the same time, is shown in the drawing. It consists of a collapsible drinking cup riveted to a small brass box, of a size suitable to hold the filter, one end of the box being left open to permit its insertion. A short piece of brass tube, fitting snugly on the

lens barrel and slitted so as to grip the latter tightly, is soldered to the other side of the holder, as shown. It is obvious that holes equal in diameter to the lens barrel must be cut through both sides of the filter holder.—J. E. Hoag, Los Angeles, California.

Stucco Finish for Bird Houses

When my son was nine years old he got very ambitious to make a bird house for the yard. I helped with suggestions and he made a bird house all right. It was made from old boxes, and although nicely designed, the lumber was rough and of various thicknesses, split, and showing several large knot holes. His difficulty was how to finish it; it did not look very promising, but after some experimenting we found a way that made a fine finish. I got a gallon of silicate of soda (water

glass) which I mixed with coarse sawdust until I had a gummy mess with which I filled in the knot holes and evened up the differences in the thickness of the lumber. This worked so well and looked so good that I got another idea. With an old paintbrush I covered one entire side of the house with the silicate of soda and immediately poured the sawdust over it, then did the same with all three remaining sides and the bottom in turn. Parts that got two or three coats by the overlapping of the compound only looked the more artistic. This coating dried in a few minutes, and in about half

an hour the sawdust stucco was as hard as could be desired.

Now I took all the old paint of various colors that I had at hand, and mixed it together to use it all up. This was dabbed all over the house in a thick coat; then I took dry pigments of different colors and sprinkled over the surface in spots and streaks. The final effect was splendid.

The boy made a number of houses of this type and although the lumber used could hardly have been worse, when treated in the manner described, all imperfections were covered. The houses stood the weather perfectly.—Luke S. Murdock, Cincinnati, Ohio.

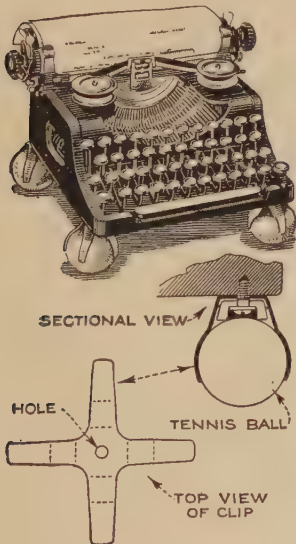
Protecting Side Curtains

If the side curtains of the car are carried around in the usual way, they soon show surface cracks, and the celluloid lights become broken. I have found that one of the best methods of keeping the curtains in good condition is to carry them in a tin can made specially for this purpose. For my car I have a can made of stovepipe tin, 4 in. in diameter and 2 ft. long. One end is closed with a wooden block, nailed in place, and the other end is fitted with a leather cap. The curtains are kept in this, rolled up, so that they cannot become damaged in any way.—R. E. Deering, Clements, Kans.

Shock Absorbers for the Typewriter

Four tennis balls or other similar hollow rubber balls, fastened to the feet of a typewriter, as shown in the illustration, make efficient shock absorbers. They make typing much easier and reduce the noise considerably. Each ball is held in a sheet-metal clip, cut according to the pattern shown in the lower detail and fastened to the typewriter frame by unscrewing the rubber foot, slipping the hole in

the clip over the screw, which holds the foot on, and then driving the screw in again. The method of doing this is apparent from the sectional view. The arms of the clip are bent downward and curved to fit the ball, and the latter is then pushed between them. Obviously, these arms should not be

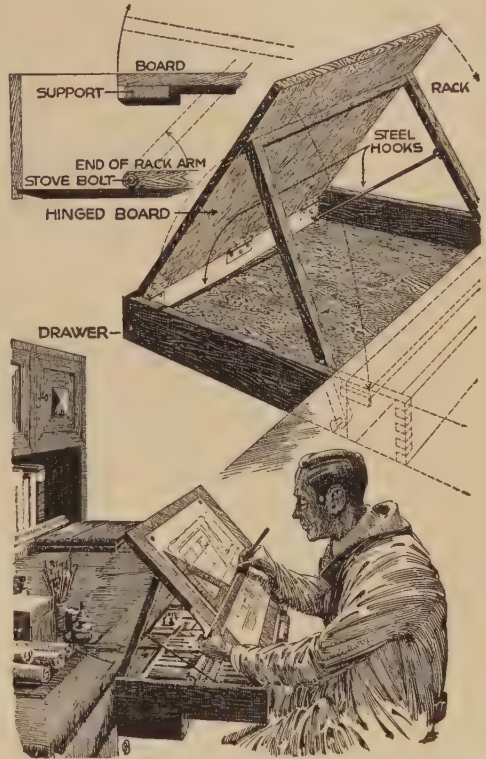


so long as to come in contact with the table or desk top when the balls are compressed, or the purpose of using the shock absorbers would be defeated.

❏ Low egg production is usually caused by incorrect feeding.

Disappearing Drawing Board

Home draftsmen, art students and others who have use for a drawing board but lack space for an easel or drawing



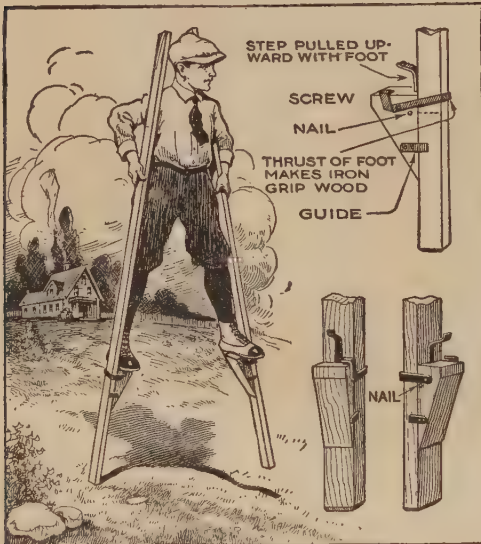
Disappearing Drawing Board Can Be Folded into Table or Desk Drawer When Not in Use

table or do not care to buy the latter too, will find the arrangement illustrated quite handy. An ordinary drawing board, the width of which is just a little less than the inside width of the drawer, is hinged to the front edge of a table or desk drawer with three or four hinges, as shown. The rack supporting the board is made of 1 by 1-in. material and consists of two legs and a crosspiece, mortised or dovetailed together. The lower ends of the legs are pivoted to the drawer sides, as shown, and are held in position, when raised, by means of two hooks, which are formed from steel or iron rod. These hooks are held by screweyes on the legs when the rack is set up. The lengths of the legs and of the hooks are determined by the angle at which the drawing board is most convenient and comfortable for the user. This forms a folding outfit, which is entirely out of the way when not in use, yet leaves

plenty of room in the drawer for materials and instruments. Cleats should be screwed to the sides of the drawer to hold the board level with the top and permit its use as an ordinary writing desk if desired. It would be advisable also to reinforce the cleats under the drawer or put on heavier ones, so that the drawer may be held more securely when pulled out.—G. E. Hendrickson, Argyle, Wis.

Adjustable Stilts

On ordinary stilts the foot supports are not adjustable. Usually they are nailed two feet or more above the ground, and it



Adjustable Supports on Stilts Can Be Pulled Up While Walking on Them

is much harder to learn to walk so high than if the supports were only about one foot above the bottom. For this reason, beginners usually start with stilts having low supports and, as they learn to maintain their balance and gain confidence, remove the supports and nail them on again a little higher up. The necessity of doing this repeatedly is avoided by fitting the stilts with adjustable supports, as shown in the drawing. These "steps" can be pulled up while walking, if desired, and cannot slip down again of themselves.

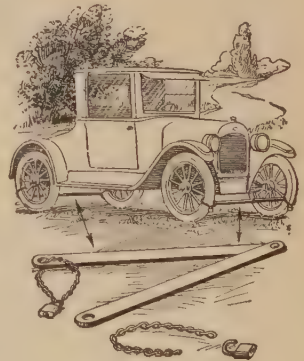
The supports are wedge-shaped wooden blocks of the same width as the stilts, which are usually made of 2-in. material. They are held on by a strap-iron band pivoted to the top of the support on both sides and bent around the stilt so that there is just a little play between the support and the stilt. One end of the band

is extended upward and bent over the top of the step as shown. This arrangement will cause the band to grip the stilt securely when pressure is applied on the support. A short length of strap iron, fastened vertically to the support and flush on the inside, is bent to fit over the foot, so that the support can be raised when necessary. Small guide strips, screwed to the sides of the supports near the bottom, keep them squarely on the stilts, and a nail below the top band prevents the lower edge of this band from binding against the stilts when the step is to be lifted.—F. E. Leitch, Brooklyn, N. Y.

Locking Auto Wheels

When, for some reason, you have to leave your auto along the roadside or highway, some means of locking the tires, wheels, and other accessories, which are attractive items to road thieves, is desirable. A simple means of doing this, which also prevents theft of the car itself, is shown in the illustration. The locking device consists of a heavy bar, which fits between the wheels, as shown, and a heavy chain and padlock at each end for fastening the bar to the wheels. The bar is cut in the center and the parts are riveted together to permit folding, so that it can be conveniently carried under the rear seat. The method of using these locking devices is self-evident from the drawing.

A pair should be made, one for the front and the other for the rear wheels. If a spare tire is carried, it, too, can be chained to the rear bar.—Wm. T. Peck, St. Petersburg, Fla.



While putting up gutters several miles from the shop, a mechanic found that the anchors had not been sent along. Finding some 12-gauge telephone wire about the place, he cut this to length, doubled it, and, holding the ends in the vise, fastened the doubled ends in a brace and twisted each length up hard. These formed excellent anchors.

Adjusting Ford Coils

Few drivers thoroughly understand the adjustment of the vibrator ignition coils used on Ford cars; hence the expense of frequent service and new parts is usually high.

The tension at the base of the spring on the top of each coil controls, within limits, the amperage of the coil. The amperage of the coil, however, cannot be adjusted by means of the thumb-nut on the spring, but, as the springs on some coils become weak with long-continued use, either the bases on which they are mounted must be changed, or the tension raised or lowered by one of two methods. The first is to place several thicknesses of paper, $\frac{1}{4}$ in. square and with a hole punched near one side through which the screw can pass, under the spring base at the one screw or the other. The second is to tap the screw heads with a light hammer if the tension is to be increased, or to pry up the back of the base with a screwdriver if the tension is too strong. The tension must always be determined by means of an ammeter, which should indicate a current in the primary circuit of 1.5 amp.—a current that will produce a spark $\frac{3}{8}$ in. long. An amperage of more than 1.5 is liable to cause heavy sparking at the vibrator points and shorten their life, while a lower amperage will fail to do the work.—W. E. Bramel, Eugene, Oregon.

Packing Washers Made from Old Hat

When the water pump on my automobile needed repacking, I found that I had no new felt washers on hand, and cast about for something from which to make them. Finding an old felt hat, I cut the washers from this, and then boiled them in a mixture of tallow and plumbago. The washers made in this way were found superior to those originally used.—N. C. Kern, Birmingham, Mich.

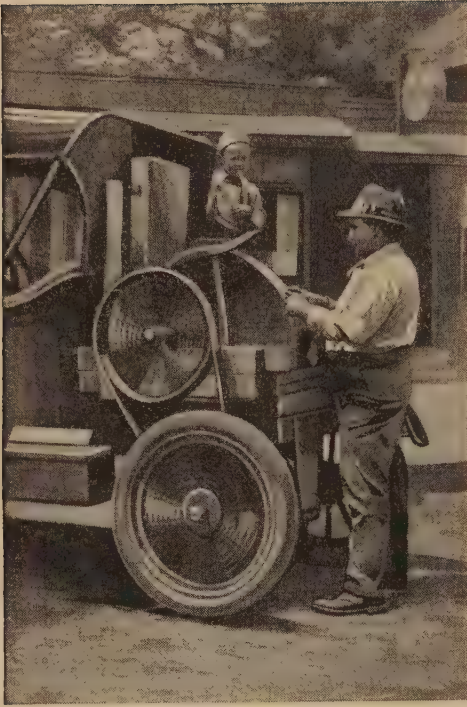
A Durable Lawn Swing

Every child who has access to a lawn swing knows how to play "street car," where the one who propels the swing acts



Lawn Swing Suspended from Iron Frame That Has Been in Continuous Use for Eight Years and Is Still in Good Condition

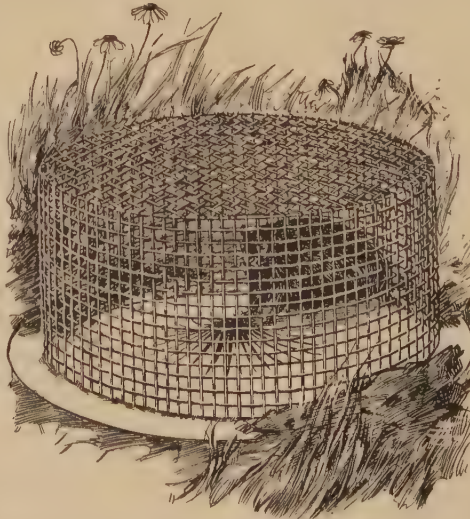
as "conductor." Continued usage in this way soon wears out most wooden swings, and the part that breaks down first is the frame. A durable swing, which will outlast most wooden ones and has not the usual clumsy frame, is shown in the drawing. The swinging part is of wood and made according to the usual design. It is suspended from two lengths of heavy T-iron, which are bent at an angle and braced at the ends with 1-in. rods on which the swing is hung as shown. This assembly is supported on a length of 2-in. pipe, mounted between the corner of the house and a 10-ft. post of 4-in. pipe, set in concrete. U-bolts, hooked around the horizontal pipe, are fastened to the T-iron braces at the point where they are bent. Iron pins, slipped through holes in the pipe, keep the swing from moving toward the house or post. A swing of this kind has been in continuous use for eight years and is still in good condition.—Dr. W. I. Brown, Savannah, Mo.



Tourist Earns Traveling Expenses with Auto-Driven Grindstone

An Auto-Driven Grindstone

A tourist who wished to make a living en route, mounted a grindstone on the back of his roadster, as shown in the photo, belted it to the brake drum of the left rear wheel when he wished to use it and proceeded to sharpen all the knives that needed attention in the neighborhoods he passed. The fender was removed but was used as a water guard over the stone, while another old fender was placed underneath to hold water. The drivewheel of the grindstone is 16 in. in diameter and has a 3-in. face. When the grindstone is to be used, the rear left wheel is jacked up, the other blocked, the belt put on and the motor properly throttled down.



Cheap Burrow Trap Made of Sheet-Iron Base and Wire-Mesh Sides

Baby-Proof Trash Holder

To protect the baby's fingers from sharp tin cans among kitchen rubbish, and also to prevent it from strewing the trash all over the kitchen when mother's back is turned, a baby-proof trash holder will be found of considerable usefulness. A 50-lb. lard can is obtained from the grocer or butcher, and a hole, about 6 in. in diameter, is cut in the center of the cover, the edge of the hole being turned over on the underside. The rubbish is thrown through this hole. A newspaper lining saves frequent washing and a few drops of disinfectant may be used to prevent odor, but this is not necessary if the pail is kept clean. It can be quickly washed by using an old mop and a little lye solution. A coat of paint and then a coat of enamel will make the appearance of the container unobjectionable so that it will be a most welcome addition to the kitchen.—V. S. Martin, Detroit, Mich.

Easily Made Burrow Trap for Farm Is Adjustable for Various Animals

If you dislike the use of a steel burrow trap, here is one which will prove quite effective and is easy to make. Get a sheet of iron, about 4 ft. in diameter, and make a number of 4-in. cuts radiating from the center. Bend the sharp points up slightly to form an opening, from $1\frac{1}{2}$ in. to 3 or 4 in. in diameter, according to the size of the animal you wish to trap. Make a cage of $\frac{1}{4}$ -in. wire mesh, somewhat smaller than the sheet-iron base. Cut one strip for the side and either solder or splice the seam. Solder the side to the base and also provide a removable top of the same material. Set this over an active burrow and throw some earth over the edges of the base. The animals will eventually enter the trap, being able to pass up through the prong opening but not to go down again. It may take several days to get results with this trap, but when the animals come out, you may catch the whole family.—Dale R. Van Horn, Walton, Nebr.



How to Make a Monorail Water Skipper

By L. B. ROBBINS

FOR those who love bathing and crave exciting sport with it, a monorail water skipper as described in this article will fill the bill. It can be used wherever there is a steep decline into a sheet of smooth water and will provide plenty of thrills and safe, healthy fun.

The monorail is the first part to build and must be constructed at an angle sufficiently steep to give the skipper plenty of speed before it takes off onto the water. The core of the monorail consists of lengths of 2 by 4-in. stock, turned on edge. The upper surface should be planed and sandpapered smooth, but the remaining three sides may be left rough. Set the posts down the incline in a perfectly straight line to the water, stretching a line between two stakes to get the proper height for each post. Spike the two-by-fours to the

posts, making the ends of the abutting members meet over the centers of the posts. Where the rail approaches the water's edge it must be gradually leveled



and end in a slight upward sweep as shown. This can be done by making the sections about 5 ft. long or even less, and changing the level of each as they are extended. In any event, the sweep should be planned ahead so that the curve will not be

abrupt at any point, otherwise the skipper will not slide easily on the rail. Any undue friction will reduce the speed and retard the take-off. When the timbers are all arranged in their proper position and spiked to the posts, the sides must be nailed on. These consist of planed boards, 6 in. wide, nailed to the 2 by 4-in. timbers so that 2 in. of the boards

A Simple and Easily Made Amusement Device for the Summer Camp, Which Will Provide Endless Amusement for the Bathers

project up past each side of the timber and parallel with it. Use $1\frac{1}{8}$ -in. boards if possible, as they will make a stronger side and give greater bearing surface for the skipper. At the bends, the top edges may be slightly curved with a drawknife, to smooth out the angle where the sections meet. The take-off should be at least 1 ft.

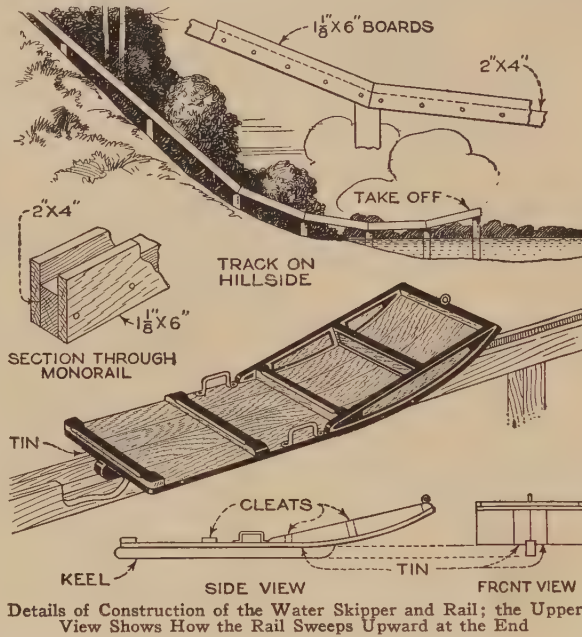
above the water level. Greater height will add zest to the jump, but the length of the slide must be considerable to insure sufficient speed for the skipper to jump far enough without making too great a splash when it strikes the water.

The skipper is built of thin boards, similar to a toboggan. Cut out two sideboards as shown and nail three cleats between them and following their curve.

Thin matched boards are best for the bottom, although plain boards may be used. They should be 5 ft. long and should be strengthened with two more cleats on the flat part, as indicated. Just aft of the ends of the sides fasten a handhold to each side of the skipper for the occupant to grasp. A ring should be provided in the bow cleat to which may be attached a tow rope. Turn the skipper over and bolt a keel, 3 ft. long and 2 in. square, down the center of the bottom in the position

shown in the drawing. Bolt it solidly through the bottom boards and counter-sink the heads in the keel so there will be no obstructions. Last, nail a strip of heavy tin or galvanized sheet iron along the bottom on each side of the keel, the entire length of the hull. This presents a smooth surface to the rail. Set the keel of the

skipper in the slot of the monorail to see that it fits loosely. If not, plane off some from the sides, and also from the bottom if it tends to rest too heavily upon the top of the core. Then plaster the groove and top edges of the sides with a good grade of soft soap or even light grease. Old oil and grease taken from an automobile engine will do very well. The groove should be made as slip-



pery as possible. Sit down on the skipper and grasp the handholds. Then push off and sit steadily in the middle. The skipper will gather momentum rapidly and should leave the take-off at high speed. If the run has been made sufficiently steep and long enough, the skipper will jump from the take-off several feet before touching the water and will then skip one or more times before losing headway and going under. Then carry the skipper ashore and up the hill and try it again.

Preventing Spotting of Shades

Light-colored window shades are often spoiled by stains caused by flies and bugs being rolled up and crushed when the curtain is raised. This usually occurs on cold mornings when the flies are too sluggish to move quickly. A simple method of preventing this trouble is to tie a length of heavy cord or twine across the window and against the curtain so that when the curtain is raised it will rub against the twine and the flies will be brushed off. The

twine can be attached to two screweyes driven into the sides of the window casing.

Preventing Ropes from Untwisting

Untwisting of ropes is usually prevented by tying a knot at the end but it is often desirable to have a rope free from knots. In such cases the best method of preventing the ends from raveling is to clinch a hog ring around them. Large ropes, one or more inches in diameter, need two or three rings but small ropes only one.

INDEX

- Adhesives, how to apply 338
- Aladdin's lamp, electric 75
- Alarm, electric, combined with door bell 186
- Alarm clock, muffling the 63
- Aluminum oil pans, repairing cracked 437
- Aluminum paint
for auto rims 405
hints on use of 62
- Ammeter, how to make 150
- Amusement Devices
backyard swimming pool 10
boat for the swimming pool 17
boomerangs 29
box kite 137
Chinese kite 210
combination roll-down and seesaw 119
Filipino "Yo-Yo" 23
folding seesaw 331
home gymnasium 43, 49
imitation street-car line 374
merry-go-round thriller 209
monorail water skipper 459
"out board motor" 57
paddle boat 172
paper balloons 215
plane for Lindy Junior 1
revolving teeter-board 297
roller coaster 386
round swing 192
scenic coaster 326
slide for children 16
square rigger 155
straddle bug 353
walking stick 439
- Animals, small, trap for 160
- Annealing chisel, steel 362
- Ant, exterminator, effective 406
- Antidote, for squirrel pest 115
- Arms, a drip shield for 258
- Arms and armor, imitation
Part I 235
Part II 242
Part III 248
Part IV 263
Part V 271
Part VI 279
Part VII 284
- Art, homemade academy board 74
- Astronomy, a homemade equatorial 253
- Auto, drums, orchestra chimes from 390
- Automobiles
aluminum paint for rims 405
avoiding locking of steering gear 443
baby carrier for small 201
buzzer to prevent running with emergency on
care of doors 60
changing tone of horn 184
connecting stop light 302
conserving motor heat in zero weather 28
correcting a binding latch 64
cover for auto-tire padlock 59
deflector for auto heater 199
don't grease the springs 212
easy method of replacing rear end 15
emergency spring repair 335
exhaust-heater for coffee pot 178
fence post pulls out of mudhole 247
filling gas tank 157
greasing front wheels 320
holes for seat-cover fasteners 140
homemade snubbers, stop rebound 141
hot-water bag makes portable gas can 234
light to illuminate motometer 15
locking wheels 456
match scratcher on steering wheel 434
moving on ice 448
natural gas for starting 68
out-of-gas kink 19
platform for washing 331
plug and jack for trouble lamp 81
preventing draft in towing car 438
preventing solid-tire wheels from slipping 337
preventing theft 232
protecting car finish 434
- Automobiles—continued
protecting side curtains 455
protecting upholstery 386
radiator automatically blanketed 149
remedy for squeaky brakes 408
removing "frozen" clincher tire 422
repairing curtain fasteners 330
rheostat controls charging rate 82
sedan hat rack, made from springs 332
shield keeps engine warm 180
side guards improve tonneau seat 146
stopping door rattle 112
thawing out frozen radiators 34
tool chest for the 165
two conveniences for the 434
vulcanizing small holes in tops 183
warm up engine soon as possible 322
windshield-wiper kink 119
- Ax, making cut easily 441
- Axle, cut without a 291
- Axle spindles, tool for removing bearing from 9
- Babbitt
bearings, repairing worn 444
ladle, an emergency 264
- Baby, support for 387
- Baby carrier, for small autos 201
- Baby walker, making safe 329
- Backyard swimming pool 10
- Bags, paper, a use for 123
- Balcony, cheap, substitute for porch 407
- Ball games, two, homemade 42
- Balloons, paper, how to make 215
- Ballroom, the magic 33
- Barn door, fly chaser 247
- Barnyard, lantern stand, portable 439
- Barrel hoops, flower stands made from 60
- Barrel-stave hammock 154
- Baseball
ball retriever for lone pitcher 443
device for throwing practice 312
- Baseboard, preventing bed from marring 330
- Bass drum, lighting effect for jazz orchestra 198
- Bathers, trolley for 147
- Batteries
gravity, why they fail to work 187
testing contacts of charging clips 165
- Battery
clips, emergency 438
sets, assembling 378
switch 171
terminals, coating 53
thermo electric, how to make 188
- Bearings, tool for removing from axle spindles 9
- Belt, round, how to make without ends 243
- Bench lathe, small, made of pipe fittings 316
- Beverages, bottling 86
- Bicycle
auto steering wheel on 78
enameling frame 385
tires, making unleakable 246
- Bird feeder, chicken-proof 441
- Bird houses
rustic 336
stucco finish for 454
that grow from seeds 332
- Birds
feeding stations for 161
winter feeder for 81
- Blade, knife, repairing a worn 228
- Block
for planing octagonal wood pieces 293
nut cracking 290
- Blotter pad, how to make corner pieces for 110
- Blotting pad, a desk 121
- Boat house, canoe jig for 411
- Boats
dolly aids in landing small 93
how to calk small 146
- Book, removing grease stains from the leaves of a 230
- Book end, rubber band replaces 181
- Book-holder, a 124
- Bookmark
a 379

Bookmark—continued				Canoe	
how to make a brass	122			carried on touring car	432
paper clip	241			how to make	451
Book rest, a	292			increasing buoyancy of	445
Books, a book-holder for	124			Canoe jig, for boat house	411
Boomerangs, throwing	29			Can opener, dollar and dime	179
Botanical specimens, preserving	304			Cardboard	
Bottle				carton, files magazines	213
clamping a cork in	125			spiral, turned by heat	226
removing cork from	32			Card case, lady's, how to make	350
withdrawing paper from under inverted	125			Carpenter's	
Bottle cleaner, chain used as	416			gauge, a	123
Bottle stopper, new way to remove	224			pencil, lines and letters made with	306
Bottling beverages	86			vise, a homemade	128
Bow, an umbrella rib	437			Carpet sweeper wheels, new tires for	266
Box				Carrier, nut and washer convenient	53
developing, how to make	220			Cart, without an axle	291
water-color	257			Casting-rod guides, keeping in line	412
Box cameras				Catamaran, cruising, how to make	423
homemade duplicators for	363			Ceiling fixtures, tool for removing lamps from	140
repairing	379			Centering, to make unnecessary	319
Boxes, rustic window	115			Chafing, trace-chain cover prevents	302
Box kite, how to make	137			Chain-pull sockets, using broken	441
Boy's coaster, four-wheel brake on	145			Chair, child's footrest on	453
Brass				Chair leg, rubber tip for	229
bookmark, how to make	122			Chairs, how to cane	259
flag, how to make an ornamental	266			Cheese-box cover, tea tray	122
frame, in repousse	237			Chemicals, protecting fingers from	283
furnace, to build a small	187			Chicken coop, keeping rats from	352
piercing-punch for	123			Chicken-proof bird feeder	441
plaques, making photo silhouette	217			Chickens, a feed box for	292
Bread, cutting	128			Chicks	
Bread knife, improving the	77			brooder for small	343
Brooder, for small chicks	343			protection for in brooder coop	166
Brooder coop, protection for chicks in	166			Children's room, rabbit book case for	107
Broom and brush holder	366			Child's	
Broom, old, crutch made from	352			bow, substitute for	183
Broom holder, made of a hinge	125			footrest, on an ordinary chair	453
Brush and broom holder	366			legging, tape on	184
Bulbs, how to make on glass tube	324			Chimney, remedy for leaky	199
Burglar alarm, how to make a simple	368			Chimney ladder, handy	138
Burglar-proof night latch	138			Chinese kite, how to make and fly	210
Burning vegetables, preventing from, in pot	114			Chisel steel, annealing	362
Burrow trap, adjustable for various animals	458			Chopping board, kitchen	123
Button, taking from child's nostril	237			Churn	
Button design, ornamental box with	403			novel improvised	141
Buttons, spark gaps from	67			small homemade	192
Buzzers and doorbells, fixing	333			Circuit breaker, for induction coils	173
Cabinet, cheap, for small parts	332			Cistern cover, safety	16
Calendar, a handy	196			Clamp, food chopper used for	62
Call-bell, return, with one wire	173			Clasp, for holding flexible lamp cords	267
Camera				Cleaner	
how to keep film negatives	194			for a stove pipe	230
how to photograph a man in a bottle	153			for white shoes	239
improving the focusing cloth	19			Cleaning	
removing developer stains	447			crotone chair covers	63
rubber band prevents exposure of film	434			hot-water reservoir	76
safety first, for the tripod	438			paint brushes	329
saving overexposed developing prints	120			rubberized garments	105
stunts for	397			Cleaning fluid, safety container for	440
Cameras, reflecting, eye shade for	412			Cleats, insulating, substitute for	348
Camp baker, how to make	143			Climbing, a tall smokestack	418
Camping				Climbing vines, fire hazard in	142
camper's cot, made comfortable with rubber				Clock	
bands	403			how to level a	78
camps and how to build them	341			novelty, for the kitchen	360
camp stool, how to make	222			old, keep running	344
collapsible tent pole	402			Clock key, emergency	138
how to fold a tent single-handed	404			Closet, pot cover	120
how to make a camp baker	143			Clothes	
how to make a shelter tent	111			reducing labor of hanging	201
iceless refrigerator for	14			removing sugar stains from	378
iceless refrigerator	444			Clothesline	
improving campers' bed	408			reel, detachable	72
makeshift lantern	266			support for double	318
novel improvised churn	141			Clothespin, new use for	234
outboard motor lights camp	417			Clothes rack, a	114
tricks of	87, 95			Clothes wringer, mangling with	112
Camps and how to build them	341			Coaster, driving by hand	338
Can covers, tool for lifting	352			Coaster sleds, rocker blocks on	223
Candle holder				Coating battery terminals	53
colonial, homemade	166			Coffee pot, exhaust heater, for the car	178
homemade	281			Coil, how to make a jump spark	185
Candlestick holder				Coins	
how to make	240			frame for displaying both sides of	220
Cane				making stick to wood by vacuum	287
chairs, how to	259			simple and safe method of sending by mail	287
tightening cane in furniture	230			Colonial candle holders, homemade	166
Cannon, a gas	197			Color wheel, old phonograph used to turn	336

Columns, preventing from rotting	442	Duplicator	
Combination		homemade	240
ladder and wheelbarrow	117	homemade duplicator for box cameras	363
lamp and picture frame	144	Easel	
Compressed air		how to make	415
cleaning away mush ice	247	lino-fronted, makes paper pinning easy	359
forces gas from hose	208	Easy designs, in ornamental iron work	370
Conservatory, a window	175	Egg beater, how to make a	291
Cooking		Egg shells, how to preserve	288
aid in mixing salad dressing	120	Ejector, for emptying wash tubs	148
spit turned by water power	174	Elderberry huller, homemade	324
Cooling kitchen air, device for	77	Electric	
Cordwood, sawbuck holds immovable	446	Aladdin's lamp	75
Cork		alarm combined with door bell	186
boring holes in	110	blue light experiment	135
clamping a	125	furnace regulator, how to make	388
holds razor blade for ripping	401	heater, made from auto parts	367
how to fit	368	light, turning on and off in a number of places	310
removing from bottle	32	motor, novel	395
Costume, made from corrugated fibreboard boxes	82	motor, small	214
Counter brush, for a shop	419	motor, small, how to make	345
Countersink, tap wrench holds	178	motor, small homemade	222
Covers, pot, homemade	297	pendant switch, how to make	310
Cretonne chair covers, cleaning	63	percolator, how to clean	35
Crossbow and arrow sling, how to make	339	Electrical	
Cruising catamaran, how to make	423	apparatus, how to make jump a spark coil	185
Crutch		detector for slight electrical charges	281
homemade	369	Electricity	
made from an old broom	352	digging worms with	144
Crystallization, instantaneous	288	writing with	153
Curb bridge, for the driveway	268	Electrolytic rectifier, how to make	197
Curbings, house numbers painted on	62	Electroscope, how to make	175
Curtain roller	419	Elevator door, plate safeguards	269
Curtain top, ornamental cover hides	437	Emergency plug, faucet used as	343
Cut flowers, to preserve longer	419	Enameling, bicycle frame	385
Cycling clown, amuses youngsters	116	Enlarging lantern, diffusing screen for	328
Daniell cell, a homemade	252	Equalizing rear wheel traction	166
Dark room		Equatorial, a homemade	253
lantern	114	Etched copper picture frame, how to make	414
lantern, temporary	340	Exhaust fan, made from windmill	232
tin-can developer for the	24	Experiment	
Darts and parachutes, toy	352	electric blue light	135
Deadeyes, making for ship models	149	interesting electrical	135
Decoy ducks, how to make wooden	432	singing telephone	154
Desk blotting pad, a	121	with electric light circuit	151
Desk drawer, mouse proof	412	Extension bells, method of distinguishing	354
Detachable		Extension, cord plug, sealing	183
clothesline reel	72	Exterminator, ant	406
plane guide aids in squaring work	35	Eye shade, for reflecting cameras	412
Detector, for slight electrical charges	281	Fan, chasing flies with	328
Developer, tin-can, for the dark room	24	Farm machinery, rubber tires for	24
Developing box, how to make	220	Fastener, sliding box cover	256
Developing prints, saving overexposed	120	Faucet, used as emergency plug	343
Developing tray, repairing a cracked composition	260	Feed box, for chickens	292
Devices of winter sports, how to make and use	380	Feeding, silo chute facilitates	105
Dial, telephone, lock for	82	Feeding stations, for the birds	161
Diffusing screen, for enlarging lantern	328	Ferroc post, pulls auto out of mudhole	247
Disinfecting poultry	212	Ferrotyping prints	445
Dog, how to chain a	257	Field rodents, catching	425
Dogs, fountain overflow provides water for	219	File, sharpening skates with a	306
Dolly, aids in landing small boats	93	Films	
Door, kennel, automatic closing	124	how to keep negatives	194
Door bell		rubber band prevents exposure of	434
combined with electric alarm	186	Finder, for photographs	28
hookup for using on 110 volt lines	142	Finger, removing tight-fitting ring from	361
Door bells and buzzers, fixing	333	Fingers, protecting from chemicals	283
Door latch, novel	234	Fire alarm, a cheap	135
Doormat, oiling the	402	Fire extinguisher, homemade	138, 351
Door silencer, for sick room	99	Fireplace, lighting a fire in new	184
Double clotheslines, support for	318	Fire prevention, hints on	336
Draft opener, an automatic	174	Fire screen	
Drain pipe, leaky, repair for	147	how to make	160
Drain tile, novel use for	200	leaded-glass	295
Drawers		First aid, taking button from child's nostril	237
locking several with one lock	314	Fish, beaded hook attracts	406
several locked with one bolt	181	Fisherman	
steps built on	386	automatic mechanical	305
Drawing board, disappearing	455	practical kinks for	20
Dressing floor in small hallway	62	Fishhook box, a	379
Drier, for footwear	229	Fishing	
Drill gauge, a handy	252	beaded hooks, attracts fish	406
Drinking fountain, sanitary on pump	269	effective fish lure	109
Drip shield, for the arms	258	fish signal through ice	106
Driveway, curb bridge for	268	keeping casting-rod guides in line	412
Drum, increasing jazz effect of drum	179	making case for fish rod	323
Dry cells, increasing voltage of run down	106	novel fish trap	446
Dry cleaning mixture	28	through ice with a tip up	281
Drying, photo postal cards	453	Fishing lines, set, automatic indicator for	74
		Fish lure, effective	109

Fish rod, making case for	323	Greasing, front wheels of automobile	320
Fish signal, for fishing through ice	106	Grindstone, auto driven	458
Fish trap, a novel	446	Ground glass	
Flag, how to make an ornamental brass	266	a substitute	255
Flake glue, improving	119	imitating	294
Flashlight holder, hooks on belt	433	Ground wire, for ignition breaker	112
Flatiron rest	123	Guitar, that is easy to make	320
Flat surfaces, polishing	229	Gun, cleaning rust from	437
Flies, chasing with a fan	328	Gun barrel, how to remove a stuck rag from	131
Floating swimming pool, safe for children	113	Guns, how to take care of your	203
Floor		Gymnasium, your home	43, 49
covering, roofing used as	41	Hacksaw blade, knife made from	292
dressing, in small hallway	62	Hammered, copper plaque	376
polisher, homemade	106, 350	Hammock, barrel stave	154
Floors, painted in two colors	212	Hand pump, made from auto oil pump	445
Flower pot		Hand vise, homemade	280
stand	125	Hanging	
window shelf for	292	clothes, reducing labor of	201
Flowers, decoloration by fumes of sulphur	288	sash, on poultry house	234
Flower stands, made from barrel hoops	60	Harmonograph, a line	126
Flychaser, barn door	247	Hat hangers, for the closet shelf	94
Fob, watch, how to make	223	Hawk trap, effective	329
Focusing cloth, improving	19	Hedge shears, improving	305
Folding quilt frames	258	Hinge, broom holder made of a	125
Food chopper		Hinges, imitation fancy wings on	224
grinding juicy substances	157	Hitch, quick, for rowboat	48
used for clamp	62	Hoist, for filled sacks	328
Footwear, drier for	229	Holder	
Ford		for conical paper cup	411
adjusting coils	457	for flexible lamp cord	317
gasket for old-type muffler head	448	for hot pie tins	41
gauge for crank case	24	how to make a postcard	363
inflation of balloon tires	54	sheet metal whisk broom holder	221
lock for coupe	145	Holes	
locking car windows	99	boring in cork	110
loose coil bridge causes spark to miss	142	cutting circular in thin sheet metal	127
preheater for inlet manifold	304	sizing threaded	295
preventing choker wire damage on radiator	386	Homemade electrical devices	
protection for radiator core	140	how to make an ammeter	150
stopping rear-wheel grease leaks	416	Honey bees, watering	378
Foundry work, at home	167	Horsepower, of small motors, finding	238
Frame		Horses, trace-chain cover prevents chafing	302
brass in repousse	237	Hose	
for displaying both sides of coins	220	compressed air forces gas from	208
Frames, attaching screen to with center rails	304	roller guard prevents abrasion of	138
Fuel, paper pulp makes good	181	Hot pan or plate lifter	318
Fuming of oak	196	Hot water	
Funnel, venting a	318	coil in range	422
Furnace		reservoir, cleaning	76
brass, to build a small one	187	House numbers, painted on curbing	62
cleaning smoke pipe	41	Huller, elderberry, homemade	324
covering, soot for	182	Hulling black walnuts	275
electric, how to make a small	136	Hunting	
regulator, electric, how to make	388	how to build good shooting blinds	426
Furniture		how to make wooden decoy ducks	432
retouching scuffed places on	177	how to take care of your guns	203
tightening cane in	230	Hygrometer, how to make	188
Galvanic Daniell cell, a homemade	252	Ice	
Garage doors, keeping snug	207	carrying on runningboard	117
Garden hose, tape repair for	412	fishing through with tip-up	281
Garment hangers, keeps moths away	99	game played on	216
Garments, removing rubber tissues from	328	peculiar properties of	172
Gas, compressed air forces from hose	208	Ice bicycle, power driven	276
Gas cannon, a	197	Ice box, detachable from running-board	442
Gas jet, shade holder bracket for a	419	Ice skates, lads make their own	165
Gaslight, how to light without matches	394	Ice sled, make and sail your own	36
Gasoline hose, rain cap for	401	Ice yacht, how to build	307
Gauge		Iceboat runners, shock absorbing	219
carpenter's a	123	Iceles, removing from flat roof	449
drill, a handy	252	Ignition breaker, ground wire for	112
for Ford crankcase	24	Illusion	
Gear, for model work	225	for window attraction	239
Gearwheels, how to make without a lathe	134	optical	153
Gilt articles, how to brighten	19	optical	171
Glass		optical	348
blowing and forming	420	roller coaster	293
ground, imitating	294	rolling uphill	361
ground, a substitute	255	traveling up an incline	293
letters, removing from window	319	Imitation arms and armor	
panes, broken, buttons and hairpin mend	268	Part I	235
stoppers, removing stuck	118	II	242
tube, how to make bulb on	324	III	248
Glue, flake, improving	119	IV	263
Gold leaf, making adhere permanently	181	V	271
Golf, in your own backyard	409	VI	279
Grape arbor, how to build	152	VII	284
Gravity batteries, why they fail to work	187	Incubator, egg hatching cabinet	447
Grease, how to remove from machinery	216	Indian clubs, weighting	318
Grease stains, removing from leaves of a book	230	Indicator, electrically operated for weather vane	348

Induction coils, circuit breaker for	173	Magic lantern, using the sun's light	251
Inscriptions, burning on trees	133	Magnet, for work basket	292
Insect, catching at night	442	Magnetic	
Insulated box, for milk bottle	208	maze puzzle, how to make	129
Insulating cleats, substitute for	348	rake picks up nails	405
Ironing board		Mail, simple and safe method of sending coins by	287
iron rest for	288	Mail box	
spring hooks for	67	and gatepost	438
stand	121	unusual and attractive	365
Iron rest, for an ironing board	288	Mailing photographs, how to	312
Irrigating, with tomato cans	450	Mangling, with clothes wringer	112
Japanese portieres	265	Manuscript, photo holder on	407
Jelly-making stand	290	Marble, the rolling	197
Joinery, dovetail joint puzzle	236	Masquerade, costume made from corrugated fiber-board boxes	82
Kennel door, automatic closing	124	Matches	
Kennel and woodbox, combined	344	how to light gaslight without	394
Kerosene, use of in polishing metals	364	how to waterproof	408
Key card, for writing unreadable postcards	127	Match holder, how to make of wood and metal	282
Key, telegraph, homemade	283	Match safe, homemade	194
Kitchen		Meerschmum, cement	315
chopping board for	123	Mice and rats, killing	293
novelty clock for	360	Milk bottle, insulated box for	208
scissors handy in	56	Model maker's vise	109
Kitchen air, device for cooling	77	Modelmaking	
Kitchen knife, sharpener	379	how to make small gearwheels without a lathe	134
Kitchen table, casters for	433	how to make a three-way cock	151
Kitchen utensils		Model planes, better wings for	7
from ice-box shelves	315	Model steamboat, a simple	216
homemade egg beater	291	Model work, gear for	225
Kites		Monorail water skipper, how to make	459
box, how to make	137	Morris chair back rest, safety stops for	139
"drinking-cup"	315	Moths, garment hanger keeps away	99
of many kinds and how to make them	391	Motometer, light to illuminate	15
rubber bands in the balancing strings of	270	Motorcycle, runners for	180
Knife, made from a hacksaw blade	293	Motor	
Knife blade, repairing a worn	228	electric, novel	395
Knives and forks, care of	178	small electric	214
Knots, "killing"	443	small electric	345
Ladder, repaired with wire	212	small electric, homemade	222
Ladle, an emergency babbitt	264	water, homemade	311
Lady's card case, how to make	350	Motors, small, finding horsepower	238
Lamp cord		Mouse-proof desk drawer	412
clasp for holding flexible	267	Mouse trap, homemade	450
flexible holder for	317	Mouse traps, setting	181
Lamp sockets, how to make miniature electric	270	Moving sign, attracts attention	323
Lamps		Moving target, for wing shooting	303
how to make burn brightly	364	Mowing lawn banks	328
testing small electric	314	Mud hole, fence post pulls auto out of	247
Landscaping		Mush ice, compressed air cleans away	247
how to lay out a sundial	261	Musical instruments	
how to make and keep a good lawn	83	guitar that is easy to make	320
Lantern		windmill	153
a dark room	114	Nails	
dark room, temporary	340	method of starting	302
makeshift camper's	266	small, holding securely	48
Lantern slides, how to make	220	Necktie	
Lard can steam cooker	289	holder, homemade	369
Large scale, weighing light objects on	366	rack, easily made	448
Laundry, ejector for emptying wash tubs	148	Negatives	
Lavatories, sleeve holders for	121	how to remove paper stuck to	250
Lawn		making proof before dry	125
how to make and keep a good	83	Newspaper container	378
protecting	407	Night latch, burglar-proof	138
Lawn banks, mowing	328	Night shooting, an illuminated target	291
Lawn mower, manipulating on terraces	15	Night skaters, beacon for	94
Lawn sprayer, simply constructed	146	Novelty clock, for the kitchen	360
Lawn swing, a durable	457	Nut and washer, carrier, convenient	53
Lead stuck, removing from refillable pencil	202	Nut-cracking block	290
Leaded glass fire screen	295	Oak, fuming of	196
Leaks, stopped with bullets	142	Octagonal wood pieces, block for planing pieces	293
Leather		Oil drum, makes good stove	118
softening in gloves and boots	188	Oiling the doormat	402
spectacle case, how to make	228	Old paint	
table mat of	286	reclaiming	148
Letter holder, of pierced metal	294	removing	396
Letters and lines, made with carpenter's pencil	306	Old pump, making sanitary	449
Letters, glass, removing from window	319	Old screen wire, uses for	54
Level		Old-time magic	193, 244, 251, 256
a clock, how to	78	Optical illusions	153, 171, 348, 364
tin cup used as	184	simple toy provides	444
Lifter, hot pan or plate	318	Orchestra chimes, from auto drums	390
Lights, turning on and off in a number of places	310	Organ bellows, repairing	323
Line harmonograph, a	126	Ornamental	
Lines and letters, made with a carpenter's pencil	306	box with button design	403
Lock, locking several drawers with one	314	iron work, easy designs in	370
Lubricating oils, test for	118	Outboard motor	
Luggage carrier, for the roadster	387	detachable handles for	403
Machinery, how to remove grease from	216		
Magic, spooks in the dark	199		

Outboard motor—continued		
how to handle hot	16	
is not baggage	93	
Outfit, perfume-making	363	
Packing washers, made from old hat	457	
Paddle boat, how to make	172	
Pail lid, holding tight	434	
Paint, aluminum, hints on use of	62	
Paint brushes, cleaning	329	
Painter, hints for	407	
Painting		
applying undercoat for enamel	332	
springs, spray pump for	182	
Paper, withdrawing from under inverted bottle	125	
Paper bag, tying to make carrying handle	106	
Paper bags, use for	123	
Paper balloons, how to make	215	
Paper-clip, bookmark	241	
Paper cup, holder for conical	411	
Paper cutting, a miniature war dance	255	
Paper pulp, makes good fuel	181	
Parachutes and darts, toy	352	
Paraffin		
used for waterproofing canvas	401	
wax, keeps paper clean	200	
Pen, fountain, for an ordinary	450	
Pendant switch, how to make an electric	310	
Percolator, a plant-food	258	
Perfume-making, outfit	363	
Pest, antidote for squirrel	115	
Phonograph		
diaphragm, substitute for	338	
repairing a broken spring	316	
Photograph, radium, how to make	108	
Photographic jig-saw puzzle	361	
Photographs		
finder for	28	
how to mail	312	
how to print on silk	396	
mounting in plaster plaques	287	
Photography		
ferrotyping prints	445	
homemade tripod holder	285	
how to make a developing box	220	
how to make four pictures on one plate	134	
how to remove paper stuck to a negative	250	
lens shade and ray-filter holder	454	
printing masks for	425	
toning blue on bromide and platinum	128	
Photo holder, on manuscript	407	
Photo silhouette, making brass plaques	217	
Picture frame		
etched copper, how to make	414	
making	142	
Pictures, kink for hanging	191	
Pie tins, holder for hot	41	
Pierced metal, letter holder of	294	
Piercing punch for brass	123	
Pin ball, how to make	314	
Pine-cone novelties, you can make	298	
Pirate chest, you can make	100	
Piston rings, arranging	131	
Plane guide, detachable aids in squaring work	35	
Planing, block for octagonal wood pieces	293	
Plant-food percolator	258	
Plants		
a window conservatory	175	
first aid to frozen	449	
Plaque		
hammered-copper	376	
plaster, mounting photographs in	287	
Plaques, brass, making photo silhouette	217	
Plaster plaques, mounting photographs in	287	
Plate, safeguards elevator door	269	
Plate holders, how to make four pictures on one plate	134	
Plate or hot pan lifter	318	
Platform, an adjustable punching bag	257	
Plating, silver, how to make a small outfit	360	
Plier marks, kind for preventing	41	
Plumb, bob line, adjusting	229	
Pocket knife, playing baseball with	250	
Polisher		
floor, homemade	106	
floor, a homemade	350	
Polishing		
cloths for silver	124	
flat surfaces	229	
Polishing—continued		
metals, use of kerosene in	364	
trolling spoons	367	
Porch, cheap balcony substitute for	407	
Portfolio, how to make	225	
Portieres, Japanese, how to make	265	
Postcard		
holder, how to make	363	
projector, an electric	195	
key card for writing unreadable	127	
Pot cover		
closet, a	120	
homemade	297	
Poultry		
disinfecting	212	
house, hanging sash on	234	
watering trough	233	
Power sander, for home workshop	200	
Preserving, paint and enamel, method of	402	
Pressure, shower bath, an improvised	202	
Preventing, plier marks, kink for	41	
Projector, homemade, an electric	195	
Proofs, making before negative dries	125	
Pump		
rotary, how to make	159	
sanitary drinking fountain on	269	
Punching bag platform, an adjustable	267	
Puzzle		
magnetic maze, how to make	129	
photographic jig-saw	361	
Quilt		
frames, folding	258	
locating knots on	145	
Rabbit book case, for children's room	107	
Racing auto, spring construction for seat	219	
Rack, clothes	114	
Radium photograph, how to make	108	
Rain cap, for gasoline hose	401	
Rain-proof, sleeping porch	330	
Rain spout, improving	164	
Rake, magnetic, picks up nails	405	
Range, hot water coil in	422	
Rats		
and mice, killing	293	
keeping from chicken coop	352	
Rat-trap, a novel	290	
Razor, sharpening	247	
Rear-wheel traction, equalizing	166	
Rectifier, electrolytic, how to make	197	
Refillable pencil, removing stuck lead from	202	
Refrigerator, drip pan	433	
Register screen, a	207	
Removing, old paint	396	
Rest, a flatiron	123	
Return call-bell with one wire	173	
Rifle barrel, small corks used in cleaning	35	
Ring, removing tight-fitting from finger	361	
Ripping, cork holds razor blade for	401	
Riveting, "dumb-boy" aids in	390	
Roadster, luggage carrier for	387	
Rocker blocks, on coaster sleds	223	
Roller, fastening a shade to	413	
Roller coaster		
illusion traveling up an incline	293	
simple	386	
Roller guard, prevents abrasion of hose	138	
Ropes, preventing from untwisting	460	
Rosin varnish, how to detect	219	
Rotary pump, how to make	159	
Round belt, how to make without ends	243	
Rowboat		
operated by bicycle mechanism	401	
quick hitch for	48	
Rubber		
bands in kite balancing strings	270	
cap on broom handle protects varnish	402	
stamps, how to make	393	
tip, for chair leg	229	
tires, for farm machinery	24	
tissue, removing from garments	328	
Rubberized garments, cleaning	105	
Rugs, keeping from turning up	54	
Runners, for motorcycles	180	
Rustic, window boxes	115	
Safety, container for cleaning fluid	440	
Safety stop, on Morris chair back rest	139	
Salad dressing, aid in mixing	120	
Sand box, for children, built of concrete	148	
Sawbuck, holds cordwood immovable	446	

Scissors			
handy in kitchen	56	Staining, wood	221
sharpening	419	Stair-carpet rods, non slipping	176
Sconce, how to make	325	Stamp album, new arrangement for	201
Scoop, a shot	230	Stamps, rubber, how to make	393
Scooter, foot brake for	77	Stand	
Screen		flower pot	125
attaching tightly to frames with center rails	304	ironing board	121
fire, how to make	160	jelly making	290
Screen-door		Starting, a siphon	408
hook, fastening securely	405	Steam, removes wall paper	78
spring, attaching	344	Steamboat, a simple model	216
Screw caps, loosening	112	Steel fence posts, use for broken	315
Seals, wax impressions from	450	Steel wool, as furnace repair	81
Separating, cream from milk	330	Stencil, how to neatly	180
Settee, homemade	385	Stilts, adjustable	456
Sewer gas, test for detecting	213	Stool	
Sewing machine		camp, how to make	222
sharpening needles	432	handy all purpose	198
tips for users	268	Stopper, bottle, new way to remove	224
Shade, fastening to a roller	413	Storage battery	
Shade-holder bracket, for a gas jet	419	determining amount of water in	390
Sharpener, kitchen knife	379	wiring accessories to	140
Sharpening		Soap, cutting for the washing machine	305
razor	247	Spectacles, make magnifying glass	289
scissors	419	Steam cooker, a lard can	289
skates with a file	306	Stove hanger on, keeps teakettle out of way	406
Shaving-brush holder	387	Stovepipe	
Sheet metal, cutting circular holes in thin	127	cleaner for	230
Shelf, convenient arrangement	413	cleaning	338
Shelter tent, how to make	111	holding securely	354
Shingle holder, convenient	445	remedy for soot-choked	302
Ship models		Strawberries, novel method of growing	157
making deadeyes for	149	Street car line, how to build an imitation	374
square rigger for the boy	155	Submarine, toy that dives	61
Shoe patches, heating	438	Sugar stains, removing from clothes	378
Shoe scraper, a	413	Sugar and starch spots, how to remove from silk	433
Shoestring watch fob, how to weave	285	fabrics	288
Shooting blinds, how to build	426	Sulphur, decoloration of flowers by fumes of	261
Shop, counter brush for a	419	Sundial, how to lay out a	261
Shot scoop, a	230	Swimmers	
Shower bath, an improvised pressure	202	lines guide under water	131
Sick room, door silencer for	99	springboard for	237
Signs, wind-proof hanger for	440	Swimming pool, floating, safe for children	113
Silk, how to print photographs on	396	Swing, homemade round	192
Silk fabrics, how to remove sugar and starch spots	433	Switch	
from	105	battery	171
Silo chute, facilitates feeding	124	pendant, how to make an electric	310
Silver, polishing cloths for	360	Table, new method of lifting	171
Silver plating, how to make small outfit	178	Table leaves, storing	439
Silverware, care of knives and forks	64	Table mat, how to make of leather	286
Single-runner sleds	408	Tank, aerating water in small tank	241
Siphon, starting	295	Tap wrench, holds countersink	178
Sizing, a threaded hole	306	Tape, on child's legging	184
Skates, sharpening with a file	176	Target, an illuminated	291
Skating pond, life preserver for	270	Teakettle, hanger on stove keeps out of way	406
Sketching, an aid in	19	Tea tray, cheesebox, cover	122
Skid chains, stowing away	99	Teeter board, a revolving teeter board	297
Sled		Telegraph, a short distance wireless	174
barrel-stave	132	Telegraph key, homemade	283
how to build a toboggan	223	Telephone	
Sleds, coaster, rocker blocks on	330	lock for dial	82
Sleeping porch, rain proof	273	right-handed for deaf	432
Sleeping tent, comfortable outdoor	121	singing	154
Sleeve holders, for lavatories	413	Tennis, improvised marker	416
Slicer, vegetable	118	Tennis-court marker	337
Slide rules, remedy for jerky	220	Tent	
Slides, lantern, how to make	339	how to fold single-handed	404
Sling, crossbow and arrow, how to make	35	pole, collapsible	402
Small		torn, simple repair for	213
corks used in cleaning rifle barrel	48	weatherproofing for	389
nails, holding securely	9	Terraces, manipulating lawn mower on	15
nut, substitute for	41	Testing, small electric lamps	314
Smoke pipe, furnace, cleaning	418	Test tube, small scale made from	442
Smokestack, climbing a tall	141	Thermoelectric battery, how to make	188
Snubbers, homemade, stop rebound	68	Thorns, used as substitute for phonograph needles	453
Soap bubbles, blowing giant	270	Thumb latch, quick acting	130
Sockets, lamp, how to make miniature electric	188	Tie clasp, a substitute	269
Softening, leather in gloves and boots	67	Tin cup, used as level	184
Spark gaps, from buttons	228	Tin drinking cup for the camp	379
Spectacle case, leather, how to make	226	Tip-up, fishing through ice with	281
Spiral, cardboard, turned by heat	174	Toboggan sled, how to build	132
Spit, turned by water power	139	Tomato cans, irrigating with	450
Spray, for cleaning typewriter	182	Tonneau seat, side guards improve	146
Spray pump, for painting springs	237	Towel	
Springboard, for swimmers	6	for lifting can covers	352
Spring gun, made from an old umbrella	67	for removing lamps from ceiling fixtures	140
Spring hooks, for ironing board	115	keeping handles on sharp-edged	304
Squirrel, antidote for, pest		Towel clip, clock spring	131

Toy			Wash day, handy tool for	358
engine, inner tube runs	448		Washing machine, cutting soap for the	305
provides optical illusion	444		Washubs, ejector for emptying	148
reversing switch for locomotive	440		Watch fob	
Toys, you can build:			how to make	223
busy blacksmith	218		shoe string, how to weave	285
cycling clown	116		Water	
darts and parachutes	352		aerating water in small tank	241
derrick	231		fountain overflow provides for dogs	219
fighting Saurians	25		Water-color box	257
kicking mule	189, 435		Water motor, homemade	311
magic ballroom	33		Water pipe	
merry-go-round	73		leak, repair for	140
nodding doggie	321		repair for leaky	268
rocking duck	80		repairing holes in	332
speed wagon	60		Waterproofing	
steam engine	152		a wall	229
submarine	61		canvas, paraffin used for	401
swinging darkey	233		Water trick, a mystifying	313
trapeze artist	353		Water wheel, how to make	374
tumbling clown	79		Watering, honey bees	378
tumbling teddy	245		Watering trough	
walking duck	55		cheap	275
whirling clown	177		for poultry	233
wind-driven tumbling clown	422		Wax impressions, from seals	450
wind-propelled wagon	359		Weatherproofing, for tents	389
windmill	447		Weather vane, "Tim Turner"	21
Tractor, magneto holds loose bolts	303		Weighing, light objects on large scales	366
Trap			Welding, method of building up broken parts	9
for rabbits, rats and mice	395		Wheel, large, quick repair for	53
for small animals	160		Wheels, carpet sweeper, new tires for	266
hawk, effective	329		Whisk broom holder, a sheet metal	221
rat, a novel	290		White shoes, cleaner for	239
Trap-burrow, adjustable for various animals	458		Windmill	
Trash holder, baby proof	458		exhaust fan made from	232
Trees, burning inscriptions on	133		musical	153
Tricks			pump, coil spring saves	431
making spirits play the violin	295		"Tim Turner"	21
moving a coin under a glass	214		Window	
vanishing handkerchief	319		attraction, for illusion	239
water	313		boxes, rustic	115
Tripod holder, homemade	284		display, a	158
Trolley, for bathers	147		shades, inexpensive	386
Trolling spoons, polishing	367		shades, preventing spotting	460
Trombone, lightweight mute for	289		shelf, for flower pots	292
Trouble lamp, plug and jack for	81		stick	450
Trousers hanger, how to make	369		Wind-proof, hanger, for signs	440
Tubes, squeezing paste from	72		Wind, propeller, how to make	415
Tweezers, powerful, simply made	201		Wind vane, electrically operated indicator for a	348
Typed papers, correcting	449		Wings, fancy, imitation, on hinges	224
Typewriter			Winter feeder, for birds	81
shock absorbers for	455		Winter sports	
spray for cleaning	139		beacon for night skaters	94
Umbrellas, identification tags on	199		devices of, how to make and use them	380
Vacuum, making coins stick to wood by	287		ice kickmobile	183
Vacuum bottle, repair for cracked	109		ice sled	36
Vacuum cleaner, helps heat second floor	182		ice yacht	307
Vanishing, handkerchief trick	319		lads make own ice skates	165
Varnish, rosin, how to detect	219		life preserver for skating pond	176
Varnishing			motor wheel	65
hint on	166		power-driven ice bicycle	276
hints on	441		single-runner sleds	64
Vegetable slicer	413		skate sailing	69
Vegetables, preventing from burning in the pot	114		toboggan sled	132
Venting a funnel	318		Wire, old screen, uses for	54
Violin			Wireless telegraph, a short distance	174
making "spirits" play	295		Wing shooting, moving target for	303
restoring tone quality	94		Wood	
Vise			for cupboards, cabinets and refrigerators	336
homemade carpenter's	128		matching new with old	268
homemade	211, 226, 340		staining	221
hand, homemade	280		Woodbox and kennel, combined	344
model, model maker's	109		Wood screw, broken, removal of	63
Walking duck	55		Work basket	
Walking stick, an electrical	413		homemade	158
Wall, waterproofing a	229		magnet for	292
Wallpaper, steam removes	78		Workbench, for the amateur	226
Walnuts, black, hulling	275		Writing with electricity	153
Wardrobe space, curtain and shelf form	42		Yacht, ice, how to build	307

